REPORT RESUMES

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PREDICTION AND UNDERSTANDING OF THE EFFECT OF CHILDREN'S INTEREST UPON SCHOOL PERFORMANCE.
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OBJECTIVE INTERESTS AND MOTIVATION MEASURES WERE STUDIED IN ORDER TO OBTAIN A SUITABLE METHOD FOR PREDICTING SCHOOL PERFORMANCE. IT WAS FIRST NECESSARY TO DETERMINE THE STRUCTURE OF INTERESTS IN CHILDREN AND TO INCORPORATE THESE FACTORS INTO A TOTAL MEASUREMENT BATTERY. THE INTEREST MEASURES WERE THEN COMBINED WITH MEASURES OF ABILITY AND PERSONALITY AND ADMINISTERED TO URBAN AND RURAL SAMPLES OF SEVENTH- AND EIGHTH-GRADE CHILDREN, NUMBERING APPROXIMATELY 150 AND 120. AT THE SAME TIME, RECORDS OF THESE CHILDREN'S ACADEMIC ACHIEVEMENT AND SCHOOL PERFORMANCE (INCLUDING SOCIAL ADJUSTMENT) WERE OBTAINED. ABILITY, PERSONALITY, AND INTEREST TEST SCORES WERE CORRELATED WITH EACH OTHER AND WITH ACHIEVEMENT-PERFORMANCE DATA. SOME SIGNIFICANT URBAN-RURAL, BOY-GIRL DIFFERENCES WERE FOUND. THE MAIN CONCLUSION, COMMON TO METHODS AND SAMPLES, WAS THAT ABILITIES, PERSONALITY TRAITS, AND MOTIVATIONAL TRAITS CONTRIBUTED ABOUT EQUALLY TO THE VARIANCE OF THE SCHOLASTIC ACHIEVEMENT CRITERION, AND MUTUALLY OVERLAP IN VARIANCE TO ONLY ABOUT ONE-THIRD. RECOMMENDATIONS WERE OUTLINED FOR APPLYING THE PREDICTIVE ACHIEVEMENT FACTORS DEVELOPED BY THIS STUDY TO ACTION MODES PRODUCING CERTAIN PERSONALITY AND MOTIVATIONAL CORRELATIONS. (JH)

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PREDICTION AND UNDERSTANDING OF THE EFFECT OF CHILDREN'S INTEREST UPON SCHOOL PERFORMANCE

Co-operative Research Project Number 701 (8383)

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PREDICTION AND UNDERSTANDING OF THE EFFECT OF CHILDREN'S INTEREST UPON SCHOOL PERFORMANCE

(A correlation study of ability, personality and motivation factor measures in relation to criteria of achievement.)

by

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PREFACE

The research reported here ran from the first of September 1959 to the end of October 1961, being granted two months extension for the completion of a last piece of experimental work. The greater part of the data was gathered in the United States, but two minor contributions to it came from Australia with the help of Dr. John Radcliffe after he left the project, and from England with the help of Dr. John Butcher, also after he had finished his year with the project. These were undertaken for cross-cultural comparisons.

A maximum possible concentration of presentation has been attempted in this final report, for the reason that other, more expanded publications are in press. In the first place, some five articles have resulted from this research, three of which are published at the present time and two of which are in press. These give more detailed information on several aspects of the research. Secondly, Dr. Cattell and Dr. John Butcher have just completed the manuscript of a book entitled, "The Prediction of School Achievement," which it is hoped to get published within a year, probably by the Bobbs-Merrill Co. Unfortunately, this book, which is about one hundred and fifty thousand words in length, cannot officially take the place of this report, because it will appear too late. The book also deals with data from many other researches gathered on a theme somewhat wider than that of the research project. However, the existence of these research publications enables us to reserve the present report for an essential statement, and, we hope, justifies our keeping it somewhat shorter than usual, leaving more detailed tables to the more extensive publications.

The writers are very gratefully indebted to a number of school superintendents and school teachers, from different areas, principally in the State of Illinois, who gave very generous facilities for the rather extensive testing and measurement which accompanied this research. We are particularly indebted to Superintendent, Dr. D. W. Dunnan and the school teachers of Springfield, to Superintendent, Mr. W. E. Baird and the school teachers of Monticello, to Superintendent, Mr. C. C. Newman and the school teachers of Paxton, Illinois.

Chapter One

HYPOTHESIS AND OBJECTIVES

The prediction of school achievement is valuable not only for the sheer understanding which we thereby achieve of the psychological mechanisms and situational conditions which lead to scholastic success, but also for two immediate practical purposes in school organization. In the first place one wishes to discover the causes and remedies of backwardness in that minority of individuals who so markedly fail to achieve that special class organization has to be introduced. In the second place, one may wish to select, in general scholarship and fellowship selection practice, those individuals who are most likely to benefit from being given special opportunities in advanced education.

Much progress has been made in regard to both theoretical and practical objectives of this kind in the field of abilities measurement. Psychologists have structured the field of abilities itself and thrown a good deal of light on the way in which various abilities contribute to various achievements. The prediction of school achievement to be expected from ability batteries alone has been refined to some value between a correlation of .5 and .6, in most circumstances. Selections for scholarship have been made by means of intelligence tests and other ability tests on the basis of the significance and magnitude of such correlations. On the other hand the prediction of achievement from personality and motivation measures is practically untouched, so that probably only one to five per cent of the total research time given to prediction of school achievements has perhaps been given to understanding these sources. Our aim was to attack this neglected problem, and to show what increments of prediction might be obtained thereby.

Actually, the few researches which have used personality and interest measures have not been particularly encouraging. Our belief that nevertheless a substantial improvement could be made on the prediction available from abilities alone was based on the fact that relatively great progress had been made in the last five years in the field of personality and interest measurement. The relative failure of the earlier studies could well be placed at the door of inadequate theory and practice in personality and interest measurement as such. The work of this laboratory over the previous fifteen years claimed to make certain fundamental progress in this area, and we believed that this basic research progress could be put to good effect in this important area to throw clearer light on the real relations.

Although our aim, as stated in the title, was primarily to make progress in the application of interest measurements to school prediction, we actually gave almost equal weight to general personality measurement. The personality measurements were necessary because we wished to demonstrate that the interest tests which we should develop would not be a mere duplication of personality tests, but would get out into fresh factor space and add to the criterion prediction something over and above what could be gained from any personality tests, however adequate.

In the design of relating (1) abilities, (2) personality traits and (3) interests and motivation to (4) achievement, we need say little about the familiar subject of the first. Essentially we accepted Spearman's and Thurstone's position of a set of primary abilities--verbal, spatial, numerical, etc.--with a single underlying general ability, "g", at the second order. Our only real innovation here was the use of culture fair intelligence tests. This use is based on the theory of "fluid" and "crystallized" general ability (Cattell, 1957), according to which most traditional intelligence tests succumb to a contamination of intelligence with achievement. They may immediately predict achievement better simply because they have part of the criterion in themselves, but what we really need in education is a clear understanding of how much achievement is really due to intelligence and how much to past achievement. If proper diagnosis of individual difficulties is to be made, as well as good prediction for the long run in scholarship selection, our predicting concept, we believe, should be "fluid" general ability as measured by culture fair tests.

The theoretical position from which we start in the personality field may be briefly stated as an empirical, factor analytic position, as developed in the contributions of Cattell and his coworkers (Cattell, 1957; with Gruen, 1953, 1954; with Blewett and Beloff, 1955; with Coan, 1958; with Beloff and Coan, 1958; with Coan, 1959). According to this there are some twenty personality factors, about 16 of which can be reliably measured, demonstrable across rating, questionnaire and objective test media. Here we measure them through the questionnaire medium. These factors are discernible in most cases all up and down the developmental range. Their meaning is in some cases coincident with what has been seen by simpler, pre-metric methods, e.g., in clinical psychology, as in the case of the ego strength (C below) and super ego strength factors (G in the test below), but in other cases is quite new, e.g., the concept of surgency-desurgency and premsia-harria. The High School Personality Questionnaire which we used covers fourteen of these factors, as described below. A further understanding of these personality dimensions follows from their re-structuring in second order factors (Cattell, 1959).

In regard to the measurement of children's interests, two recent psychological discoveries gave us hope of more substantial success than had hitherto been possible. First, there was the development of objective principles and means for measuring motivation or interest strength. Some seventy of these devices had been explored in the adult age range and about ten of them had been shown to have substantial validity in terms of measuring motivation strength (Cattell, 1957). In fact, they have given structure to the whole concept of measuring motivation strength, for a factor analysis of these devices had shown the presence of a large factor of integrated or conscious interest, and a second, largely independent factor of unconscious or unintegrated interests. Since this structure had stood up over a fairly wide adult age range and over a very great range of different attitude-interests, it seemed reasonable to expect that a parallel structure might be found in objective tests for children. Further, we could hope for equally good validities, if proper adaptations could successfully be made.

A second important foundation in the area of interest measurement lay in the fact that the application of these objective test devices to a great variety of attitudes, resulting in factor analysis of these attitudes thus measured, had yielded some ten to twenty different dynamic structures (Cattell, Sweney and Radcliffe, 1960), some of which were drives and others sentiments, i.e., acquired aggregates of attitudes learned from the impress of sociological institutions. Although the latter might not be expected to be well developed in children, it seemed reasonable to expect that the drive patterns would continue to appear and that we should thus have the basis for measuring functional, nonartificial concepts in the interests of children. Accordingly, our actual research time was planned to be spent about equally upon further exploration of the structure of children's interests in objective tests, and in the application of developed measures of those structures, along with personality and ability measures, to the prediction of school achievement.

In a more formal way, our hypotheses and concepts in the interest-motivation field might therefore be stated as follows:

(1) That the full measurement of what is conceived of as an attitude, interest or motive is not achievable by conscious, self evaluative, opinionnaire check list responses alone, but needs for full validity measurement by objective devices.

(2) That the factor analysis of a wide range of what are considered (by experimentalists, clinicians, and educators) to be manifestations of the strength of a motive, yields at least two distinct factors corresponding to (a) Integrated or conscious sources, and, (b) Unintegrated or unconscious components.

(3) That the chief structures into which the total range of life interests and attachments can be factored will turn out to be (a) drives, e.g., fear, sex, gregarious need, etc., and (b) sentiments or acquired learned aggregates of attitude about cultural objects, e.g., family, school, religion, hobby, friends, etc.

In regard to the total picture of educational achievement our hypotheses are of the exploratory kind. We feel it is profitable to proceed to more particular hypotheses only after more solid and dependable information has become available from well-conceived and factor analytically purified measurement. However, the following hypotheses may be stated:

At the eleven or twelve year old level in a typical school system we hypothesize:

(a) That about one quarter of the variance in school performance will be attributable to general intelligence. Slightly more will be covered by the primary abilities which include also some already existing achievement and study habits.

(b) That at this stage, and still more at later stages, personality differences will contribute substantially to achievement variance. We would expect about one-sixth to one-fifth at this stage, but, in college, at least as much as from abilities, i.e., one-quarter.

(c) That interest-motivation measurement (1) will structure in drives (ergs) and sentiments, (2) will be largely independent of the general personality factors, and, (3) will contribute almost as much new prediction of the achievement criterion as personality factors. At this age, therefore, all three modalities of individual differences are expected to be significantly predictive, though in declining order from abilities to interests.

Within this conservatively framed hypothesis several more specific hypotheses may be stated, as follows:

(1) That, in personality factors, ego strength and super ego strength will be positively related to achievement and dominance negatively, since docility aids class learning.

(2) That in interests some negative relation of competing interests, e.g., athletics, may be expected to achievement. Also certain drives, e.g., self assertion, curiosity should be positively related and others, e.g., pugnacity, sex, gregariousness, negatively related.

Of course, over and above the check on such specific hypotheses, and derivation of particular interest structural knowledge, we anticipated that our findings would have importance in other school problems, notably those of character development, by indicating the number of definite, quantitatively testable propositions in regard to emotional development and the way in which interest in school subjects characteristically developed from basic sentiments and drives.

The reader will note that we are making no summary here of related research (though a chapter on such appears in the book by Cattell and Butcher (1963). The reason is that in a monograph type of presentation, keeping to precise technical concepts rather than generalities, no research exists using the concepts we are now using. That is to say, no personality and achievement relations had ever previously been worked out in terms of simple structure replicated personality factors as of 1958, when we started this research. *A fortiori* this applies to the interest field, where neither the objective test devices nor the concepts arising from a complete factoring of the interest sphere of children, were available. To align one factor system with another is sometimes difficult. To align findings on achievement and personality-interest from non-factor, arbitrary scales with that from concepts emerging from factor systems would be pointless in terms of any precise common conclusions.

Chapter Two

DESCRIPTION OF THE EXPLORATORY RESEARCH ON INTEREST STRUCTURE

In the total research, as foreshadowed in the previous chapter, three relatively independent studies are strategically arranged to contribute to the final aim, as follows:

(1) It was necessary first to find the structure of interests in children, in order to develop the measures to incorporate in the total predictive battery.

(2) Using measures for these structures and combining them with ability and personality measures, the extent of prediction of the achievement criterion was evaluated. In this study the predictor measures were the raw scores on the batteries.

(3) The same data as in (2) was factor analyzed (a) to ascertain to what extent the various ability, personality and interest factors posited from previous work in these areas actually existed, (b) especially to examine the degree of independence of the new interest factors and the older general personality factors, (c) to determine the correlations of these factors with the criterion of achievement as pure factors without the error of estimate in (2) and as a check on (2).

Additionally, we made an attempt to improve the interest test battery as a battery, for further research in this area.

These four undertakings are described in Chapters 2, 3, 4 and 5, finishing with a summary in Chapter 6. Three different groups of children were used, one (rural) at Paxton, Illinois, one (urban) at Springfield,

Table 1

Outline of Analyses

	Variables			Sample		
Analysis	Type	Description	Number	Location	Type	Size
1	Interest Tests	16 Attitudes on 5 Devices Raw Scores Separate	80	Springfield	Urban	153
	Interest Tests	16 Attitudes on 5 Devices Summated Raw Scores	16			
	Interest Blank	Self-Evaluated Interests	7			
	Ratings	Teachers	7			
	Achievement	Quotient from Stanford Achievement Divided by Intelligence	1			
		Total:	111			
2	Interest Tests	32 Attitudes Ipsatized and Summated Over 5 Devices Via Standard Scores	32	Springfield	Urban	153
	Personality	HSPQ 2 Forms Using 14 Scores Each	28			
	Ratings	Teachers Behavior, Interest, Achievement	16	Paxton	Rural	124
	Mental Abilities	4 Primary Abilities 2 Split Halves	8	(Separated Samples)		
	General Ability	4 Culture Fair Subtests and Total	5			
	Interest Blank		8			
	Sociometric Data	Choices and Rejections of Peers Sex Rural or Urban	4 1 1			
	Achievement	Stanford Achievement Tests and Achievement Quotient	7			
		Total:	110			
3	Same as Above	See Above Total:	110	Springfield & Paxton Combined	Urban & Rural	277

Table 1 Continued

Analysis	Type	Description	Number	Location	Type	Size
4	Interest Tests	36 Objective Attitude measured by 4 Devices Ipsatized scores Combined Into Integrated and Unintegrated	72	Monticello		89

Table 1 Continued

Statistical Procedures

Analysis	Matrix	Size	Purpose
1	Correlation	111 x 111	To find the optimal structure of the Experimental Children's Objective Interest Test Battery as revised from earlier studies in Peoria and Mattoon
	Centroid Analysis	22 x 111	
	Oblimax Rotation	22 x 111	
	Rotations (21 Visual)	22 x 111	
	Procrustes for Optimal Structure		
2	Correlation (each sample separately)	110 x 110	Find basic differences between Rural and Urban populations in Relation to Variables measured
	Calculate Means and Standard Deviations	110	Calculate Multiple correlations relating variables to achievement
	Multiple Correlation with Variables and Achievement		
	Personality		
	Teacher's Ratings		
	Interest Tests		
3	Correlation (K-8)	110 x 110	Calculate Multiple Correlation of Predictors, Factors, Personality, Motivation, Teacher's Ratings and Abilities upon the Achievement Factor
	Factor (Centroid)	36 x 110	
	Oblimax Rotation	36 x 110	
	Procrustes Rotation	36 x 110	
	Calculate Factor Correlation of Oblique Vectors		
	Multiple Correlation using factor Correlations		
4	Centroid	18 x 72	Find independent optimal positions for integrated and unintegrated motivation structure.
	Rotate partitioned (2) Matrix	18 x 36	

the State capital, and one at Monticello, Illinois, for the check on interest structure only. The rather complex inter-relations of groups, experimental measurements and statistical analyses decided upon for maximum economy are summarized in Table 1.

As stated earlier, the novelty of the interest measurement approach here, which makes this a piece of scientific pioneering (with the advantages and disadvantages thereof) consists in (a) introduction of objective test measurement devices in place of the traditional opinionnaire, self evaluative procedures, and (b) the attempt to find and use the natural correlational structure of children's interests instead of arbitrary categories.

Progress in the first area had previously been made in this laboratory by Baggaley (1958) regarding adults and by Radcliffe and Sweney (1960) regarding children. The latter showed clearly that the validity of various devices was very similar for children and for adults, falling into some six primary and two second order motivation strength factors as summarized elsewhere by Cattell (1957). On this foundation we now built, using the following objective devices (Table 2) from Radcliffe and Sweney (1960) as best fitted for the purpose.

Table 2

Motivation-Interest Strength Measurement Devices

1. Word Association
2. Information on Means to Ends
3. Choice of Ends for Means
4. Autism
5. Reaction Time

They are described more fully below.

As to the dynamic structure to be expected in children, i.e., in the factoring of a wide range of attitudes each given a total score on the above kind of battery, we had little to guide us. It is known that in adults a widely chosen variety of some sixty attitudes factors into some nine drive factors and some six sentiment factors (Cattell, 1957; Cattell and Baggaley, 1958). The former, which we call ergs to avoid confusion with other drive theories, include sex, fear, self assertion, gregariousness, etc., while the sociologically based, acquired sentiments include sport, religion, school, the self, etc.

The only evidence that existed at the start of this study as to what dynamic structure factors would be found in children was an ongoing study by Sweney (1961). Our hypotheses were that ergs would be found of much the same number and nature as in adults, but that sentiment structures would be less definite. Some 32 attitudes were carefully designed (a) to test the hypotheses as to ergs and (b) to explore other main structures, each being measured by four devices, as shown in Table 5. It was planned to measure these on a sufficient sample of 13 year old children, to intercorrelate, determine the number of factors, and to rotate to simple structure to discover the nature of the factors.

However, for economy we planned to obtain this data on the same group as that in which we would eventually examine the correlations of the discovered interest factors with the achievement criterion. The main experimental situation as to variables, sample and time must therefore be described at this point.

The sample for this study consisted initially of 170 boys and girls from Springfield, Illinois, with an average age of 13, belonging to the 7th grade. With attritition for incomplete data we finished with 153

The battery of measurements here analyzed on this first group is as shown. In all it took approximately four hours extended over two sessions.

Table 3

Variables in First Study

1. Teacher's ratings on various aspects of school achievements.
2. An informal, self-evaluative questionnaire in which students describe their interests in the amount of time devoted to them.
3. The "disguised" objective interest test devices specially constructed to cover the hypothesized dynamic structures.
4. The main criterion data in the form of information available from school records as well as from the standard achievement test.

The test areas listed in Table 2 will be described in more detail in further Tables 3, 4, 5 and 6.

(1) and (2) were not given any great weight in our general scheme, because ratings are known to be so unreliable, but they were included to give a "framework of common sense evaluations" for the more technical material, as shown in Table 4.

Table 4

(a) Teachers' Ratings and (b) Biographical, Self Evaluation Evidence on Interests

(a) Teacher Rating: Interest in games and sports
Achievement at games and sports
Social adjustment
Leadership
Behavior record
Interest in school subjects in general
Personal adjustment

(b) Student Interest Quiz: Reading
Television
Radio
Total time at sports
Outdoors
Siblings
Position in family
Popularity

The attitudes measured by the new objective devices are shown in Table 5, where they are arranged to bring out the hypothetical structure.

Table 5

List of Attitudes in Children's Objective Interest Test Battery (First Form)

Self Sentiment	I want to be the type of person everybody likes to have around. I want to have a good reputation for ideals and honesty.
Super Ego	I want always to show self control. I want to show my father how awesome and admirable I think he is.
Security	I want to have Mother there if something goes wrong. I want my teacher to like me.
Protective	I want my younger brothers and sisters to behave and mind me. I want to have a pet to take care of.
Constructive	I want to make things and draw pictures related to our school subjects. I want to take things apart to see what makes them work.
Curiousity	I want my pictures to be beautiful and pleasant to look at. I want to read about the world.
Pugnacity	I want to get even with other kids who have caused me trouble. I want the United States to beat its enemies.
Sex	I want to spend more time with my girl friend or boy friend. I want to go to parties where couples are invited.
Patriotism	I want the United States to protect small countries from Russia. I want my team to win.
Religion	I want to worship God and obey Him. I want to pray for God's protection and mercy.
Gregariousness	I want to go to games with my friends. I want to spend more time with my friends.
Acquisitive	I want to save money in a bank. I want to be safe at home when the weather is bad.
Play Phantasy	I want to see more science fiction movies and T.V. programs. I want to have plenty of games, books and other things.
Narcissism	I want to have nice clothes so that people will like the way I look. I want to dress well in order to impress the opposite sex.
Sensuality	I like to see a handsome face and figure in the mirror. I want to have more holidays in order to rest and take it easy.
Social Desirability	I like to eat well so that I shall grow healthy and strong. I want to be polite to adults.

The criterion measures are listed in Table 6.

Table 6

Criterion Data

Stanford Achievement Tests
- Paragraph Meaning
- Word Meaning
- Spelling
- Arithmetic Reasonning
- Arithmetic Computation

The ability measures will not be described here, since they were not included in the statistical analysis at this point, though they were given. They will be described in Chapter 3 which proceeds to ability factor structure analysis. Here we need most to concentrate on the interest measures and their structure.

The choice of devices, shown in Table 2 was made on complex considerations of outcome in the preliminary work of Cattell, Radcliffe and Sweney as to which would be most appropriate and valid for this work. On the basis of convenience for group administration, even representation of the second order integrated and unintegrated factors, by two devices each, and general reliability found in the preliminary Radcliffe-Sweney studies, four devices were eventually chosen, namely word association, information on means to ends, preference of ends for means, and autism. The nature of these devices may be briefly indicated as follows. Six items were made up for each of the above attitudes, in Table 5, in each of the four devices, so there were twenty-four items in the end for any one attitude. Specimens of these tests are given in Appendix One.

When the tests had been duly administered and scored the following analyses were made.

1. An inter-correlation of the objective test devices on each of two very different attitudes, in order to check that the structure was as found in the earlier Radcliffe-Sweney studies. This may be called an analysis of the motivational component structure for the interest test battery.

2. An inter-correlation of the thirty-two attitude measurements, made in terms of the objective tests, in order to determine the structure among the interests alone before going to the general structure. This analysis was made upon a single score for each attitude obtained by adding all four components together, in the light of analysis one, and also in terms of two distinct matrices, one containing only the integrated measures and one the unintegrated.

The analysis along with the teacher ratings and self evaluations of interests was made later, because the structure of the test variables might well have been disturbed had instrument factors from ratings, etc., been allowed to intrude.

The correlation matrix and centroids from this calculation are too bulky to present here, but the final rotated matrix is given in Table 7. Tucker's test for completeness of factor extraction was used, yielding 16, and communalities were iterated to stability on this basis. The Procrustes (Hurley and Cattell, 1962) program was then used to rotate to see how much agreement could be reached with the hypothetical position. From this position ten over-all simple structure seeking shifts were made. Table 7 omits all loadings of ±.15 or less, i.e., loadings that might be considered in the hyperplane. It will be seen that a very high degree of simple structure was attained, beyond the P .01 level by Bargmann's test (1954).

Table 7

The Dynamic Structure of the Interest Tests (Attitudes)

(Springfield. N = 153)

The 32 Attitudes	Self Sentiment	Super Ego	Secur-ity	Protec-tive	Construc-tive	Curiosity	Pugnacity	Sex	Patriot-ism	Religion	Gregari-ousness	Acquisi-tive	Play Phantasy	Narcis-sism	Sensual-ity	Social Desira-bility
Be Popular	+20					(+17)										
Good Reputation	+36															
Self Control		+18														
Admire Father		+37														
Mother There			+19				(-14)									
Teacher Like			+21				(-17)									
Younger Siblings Mind				+21												
Have Pet				+31							(-17)					
Make Things					+19											
Take Things Apart					+21				(+22)							
Pictures Beautiful						+21										
Read About World	(+21)					+18										
Get Even With Kids							+13									
U.S. Beat Enemies							+26									
Girlfriend & Boyfriend								+24								
Parties With Couples								+34								(+20)
U.S. Protect Others									+19							
Team Win		(+18)							+47		(+18)					
Worship in Church										+20						
Pray to God						(+26)				+24						
Games With Friends											+22					
Time With Friends	(+19)										+17					
Save Money												+20				
Be Safe at Home												+19				
See Science Fictions													+23			
Have Books and Toys													+30			
Have Nice Clothes														+18		
Dress Well														+35		
Handsome Face & Figure														+17		
Rest															+17	
Eat Well	(+19)														+25	+25
e Polite																+23

The reader should note that Table 7 is an abstraction, for simplicity of presentation, from the larger factor matrix presented as Appendix 2.

Although the structure is very clean, and a very encouraging confirmation of the hypotheses that the structures found in children are developmentally contiguous with those found in adults (with the exception of the values shown in parentheses), the magnitudes of the salient loadings are quite small. As in most pioneer, exploratory research, one has to be satisfied with only one half of one's goal. We can demonstrate the existence of hypothesized dynamic structures, but we cannot measure them with sufficient accuracy for practical prediction. The validity of factor score estimates from loadings of this magnitude would undoubtedly be low.

It was for this reason that we undertook the research in Chapter 5 to develop more highly loaded items and better reliabilities, though this could not come in time to help strengthen our own criterion correlations. However, in Chapter 4 we have used an alternative way to ascertain the predictive contribution from these interest factors.

Chapter Three

PREDICTION OF ACHIEVEMENT FROM ACTUAL SCORES ON ABILITY, PERSONALITY AND INTEREST TESTS

Using whatever advance we may have made in interest measurement per se in the last chapter we now turned to the main objective of this research: to see how far prediction of achievement is enhanced by adding personality and interest measures to the commonly used ability measures. In this second experiment we employ actual raw scores on the batteries for these factors, without checking on the factor structure, since the ability and personality structure of the tests may be assumed from earlier researches and the interest structure has just been checked. The third experiment tackles the same objective on a different statistical foundation.

Our objectives here also included comparisons of rural and urban groups, boys and girls. The sample to be analyzed was now augmented by the addition of the rural group of 124 boys and girls from Paxton, 8th Grade, as indicated in Table 1 above. The variables, additional to those described in Chapter 2, were as follows (though we have included, for ease of reading, a brief recapitulation on Chapter 2's Interest variables).

Personality Measures

The I.P.A.T. High School Personality Questionnaire (1960) was used for this study. It is a factored self-evaluation questionnaire, with items which are relatively free of social desirability, since many of the dimensions measured have acceptable values at either end. Table 8 outlines the scales measured, giving Kuder-Richardson Reliabilities for each, based upon the standardizing population in the Handbook.

For this study, both forms A and B were used to increase the stability and hence, validity of the scales. A balanced design was used with both samples to insure that both scales were equally utilized first and second. Although the raw scores were used in the correlational analysis, the two samples were also directly compared with national norms to note their deviation from the standardizing population, as well as their differences from each other. The names of the principal personality source traits were included as shown in Table 8.

Table 8

A Description of The High School Personality Questionnaire Factors

	Low Scores	High Scores
FACTOR A	Aloof The person who scores low on Factor A tends to be aggressive, critical, obstructive, cool, hard, precise, suspicious, jealous, rigid, prone to sulk, cry and resist adult direction.	Sociable The person who scores high on Factor A tends to be good natured. easy-going ready to cooperate, attentive to other people, soft-hearted, casual, trustful, adaptable, careless, warm-hearted, and prone to laugh readily.
FACTOR B	Dull (low mental ability) The person who scores low on Factor B tends to be of lower morale, to quit easily, to be uninterested in intellectual matters.	Bright (intelligent) The person who scores high on Factor B tends to be conscientious, persevering, intellectual and cultured.

FACTOR C

Emotionally Unstable

The person who scores low on Factor C tends to be emotional when frustrated, to change his mind easily, to be excitable, over-active, evasive, and prone to worry, to quit easily, to get into fights and accidents.

Mature, Calm

The person who scores high on Factor C tends to be emotionally mature, stable, phlegmatic, realistic, placid, and prone to adjust to facts and stay out of difficulty.

FACTOR D

Phlegmatic

The person who scores low on Factor D tends to be placid, self-sufficient, deliberate, not easily jealous, self-effacing, constant, not restless.

Unrestrained

The person who scores high on Factor D tends to be demanding, impatient, self-assertive, egotistical, distractible, undependable, and prone to seek attention, to be nervous.

FACTOR E

Submissive

The person who scores low in Factor E tends to be dependent, kindly, soft-hearted, expressive, conventional, conforming, easily upset, self-sufficient.

Aggressive

The person who scores high on Factor E tends to be assertive, self-assured, independent, hard, stern, solemn, unconventional, rebellious, tough, attention-getting.

FACTOR F

Glum

The person who scores low on Factor F tends to be silent, introspective, depressed, concerned, brooding, incommunicative, languid and prone to stick to inner values.

Enthusiastic

The person who scores high on Factor F tends to be talkative, cheerful, serene, happy-go-lucky, frank, expressive, quick and alert.

FACTOR G

Casual, Undependable

The person who scores low on Factor G tends to be frivolous, demanding, impatient, relaxed, indolent, delinquent, and prone to disregard obligations to other people.

Conscientious

The person who scores high on Factor G tends to be persevering, determined, responsible, emotionally mature, contently ordered and attentive to other people and to rules.

FACTOR H

Shy	Adventurous
The person who scores low on Factor H tends to be withdrawn from the opposite sex, aloof, self-contained, restrained, conscientious, careful, considerate, quick to see danger.	The person who scores high on Factor H tends to be adventurous, active, responsive, genial, impulsive, frivolous, emotional, carefree, and prone not to see danger signals.

FACTOR I

Tough	Sensitive
The person who scores low on Factor I tends to be realistic, self-reliant, cynical, unartistic, unaffected, prone to act on practical logical evidence and be unaware of physical disabilities.	The person who scores high on Factor I tends to be demanding, impatient, subjective, dependent, kindly, artistic, imaginative, hypochondriacal, anxious, prone to act on sensitive intuition.

FACTOR J

Gregarious	Passively Individualistic
The person who scores low on Factor J tends to like to follow the group, to sink his personality into the group, to be vigorous, to accept common standards.	The person who scores high on Factor J tends to act individualistically, to be self-sufficient, fastidiously obstructive, neurasthenically fatigued, and to evaluate intellectually.

FACTOR O

Confident	Timid
The person who scores low on Factor O tends to be self-confident, cheerful, resilient, tough, placid, expedient, rudely vigorous, fearless.	The person who scores high on Factor O tends to worry, to be depressed, to cry easily, to be sensitive, exacting, fussy, hypochondriacal, moody, lonely, brooding.

FACTOR Q_2

Sociably Group Dependent	Self-Sufficient, Resourceful
The person who scores low on Factor Q_2 tends to value social approval, to be conventional and fashionable.	The person who scores high on Factor Q_2 tends to be resolute and accustomed to making his own decisions.

Table 8 Continued

FACTOR Q_3

Uncontrolled	Controlled
The person who scores low on Factor Q_3 tends to be uncontrolled, excitable, emotional, and to reject cultural demands.	The person who scores high on Factor Q_3 tends to show will power, to accept approved ethical standards, to be ambitious, considerate, far-sighted.

FACTOR Q_4

Relaxed	Tense
The person who scores low on Factor Q_4 tends to be composed.	The person who scores high on Factor Q_4 tends to be irrationally worried, too irritable, and in turmoil.

Interest Measures

The interest or motivational measurements were made using the objective devices and attitudes discussed at greater detail in Chapter 2. As we see, the analysis confirmed the structure and properties of the hypothesized 16 factors. The Appendix Table 2 gives also the analysis of the device factors and the drive factors together, showing the direction of measurement of each, i.e., that in which each should be added to the others. Each item was given a unitary positive or negative weight in making up the summated total for each factor. It will be remembered from Chapter 2 that as an additional "common sense" measure of interest, the pupil filled out a Student Interest Quiz, and the teacher was asked to rate the pupil according to his interest in such generalized areas as sports, leadership, school subjects, and social adjustment. Such ratings were not easily standardized as to meaning, and therefore, serve primarily to reinforce the findings of other instruments.

Ability Measures

The ability measures we listed in detail in Table 9. The separation of ability from achievement is relatively easy conceptually, but leaves something to be desired in the applied realm. The Primary Mental Abilities Test (1958) was chosen because its rather abstract dimensions could not be directly integrated as achievement. The numerical subtest could be properly confused with arithmetic achievement, but was left in the battery because of its purity and established relation to the other parts of the test. This test is the result of factor analysis, and is consequently particularly appropriate in providing relatively uncorrelated predictors in finding multiple correlations.

Table 9

Ability Measures

- Primary Mental Abilities (Thurstone)
  - Verbal Ability
  - Spatial Ability
  - Reasoning Ability
  - Number Ability
  - Word Fluency
- Culture Free Test, Scale 2 (Cattell)
  - Series
  - Classifications
  - Matrices
  - Conditions
  - Total Score

The Culture Fair Test (1956) was chosen as a single test of general mental ability or intelligence, which would be relatively free from scholastic achievement, notably reading bias. The general form of the subtests make them particularly unrelated to any of the formal disciples normally referred to in the evaluation of achievement. Most of the other group intelligence tests encounter the criticism that they contain much of the external criterion which they aim to predict, i.e., we gain inadequate psychological understanding from the prediction.

Achievement Measures

The problem of achievement measurement was introduced in the previous section. Its measurement implies the recognition of the ultimate purpose of education, in order that the quality of achievement of this goal can be quantified. Accepting standard curriculum classifications and those areas measured by standardized tests as being central to the purpose for education, achievement measures were based upon these.

The homeroom teacher was asked to rate her pupils in relation to the usual subject areas: mathematics, science, language, English, art, music, geography and history. She conferred with specialized teachers where this information was not readily available from her own grades or records. Certain difficulties in getting reliability between rates made this area of the criteria somewhat invalid. Its value, however, lies in the fact that it does measure the subjective dimension of achievement, which relates to whether a student is scholastically pleasing his teachers. For this reason alone, it was included in the study.

The Stanford Achievement Test was an instrument common to all the school districts tested. In cases where a student had not previously taken the battery, he was given it at the time of this testing, and his results adjusted retroactively to correspond to the earlier testing of the majority. This Battery measures paragraph meaning, word meaning, spelling, language, arithmetic reasoning, and arithmetic computation. In Paxton, data on the California Achievement Tests were collected but found unusuable, because the results were uniformly high compared with those from the Stanford Achievement Test.

The achievement quotient was calculated by dividing the achievement score by intelligence, as measured in the Culture Fair Test. This value is useful when measures of accomplishment are desired, with intelligence more or less held constant. It was expected that this would be particularly sensitive to the behavioral dimensions measured by personality and motivation tests.

Procedures

The test battery was given to 154 pupils in the 7th and 8th grades of a junior high school located in an upper middle class district in Springfield, the state capital. It was administered in the school cafeteria to half the group at a time in a testing sequence that lasted over three days with only half of each day of the students' time being taken from his studies for testing. Where as different psychologists were responsible for the administration of different parts of the total battery, the same tests were always administered by the same person in order to avoid inter-administrator variance. Rest breaks were given after each hour and a half of testing to help relieve fatigue and to keep the positive motivation as high as possible throughout the entire battery.

The Paxton sample of 124 children were in attendance at the only junior high school and came largely from surrounding farm areas which were serviced by means of school buses. The administration recognized the same principles explained in relation to Springfield except that the testing was done in the actual classroom with the teachers in attendance but not actively participating.

A data matrix was made up from the scores of all the relevant portions of the tests given. These data were then correlated by variables with the help of the electronic computor to yield their intercorrelations. The data was then reorganized and resubmitted to determine multiple correlations with criterion measures. Teacher ratings and the standardized achievement tests were used for this purpose. It was recognized that teachers ratings are fallible measures of any ideal or theoretical measures of achievement; they are, however, by definition pragmatic measures of what teachers expect and, hence, how achievement is usually measured.

Results

The relationships obtained from this set of analyses fits into these major classifications: personality and criteria measures, abilities and criteria measures, drives and criteria measures, reference group differences, and beta weights relating personality and motivation to school success. The multiple correlations obtained from these predictor variables in various combinations will be discussed in Chapter 6 with the multiple correlations computed using factorial predictors.

Reference Group Differences

One of the major purposes of the study was to determine the differences of operation of the predictors and criteria among the reference groups studied. The evaluation of the significant differences cited in Table 10 should be made with recognition to limitation in sampling scope. The size of sample was utilized in the calculation of the significance levels originally.

Table 10

Significant Differences Between Means for

Boys-Girls and Urban-Rural Groups

Scales	Urban	Rural	Boys	Girls
Teacher's Ratings	Higher 1% level on all scales except personal adjustment	None Significant	None Significant	Higher 1% behavior and interest in school Higher 5% level leadership and games
Student Interest Quiz	None Significant	Higher 1% level in popularity and number of siblings	Higher 1% amount of time on sports	None Significant
Stanford Achievement Battery	Higher 1% on arithmetic computation and reasoning	None Significant	None Significant	Higher 1% spelling and language
HSPQ	Higher 1% O Timidity J Passive Individuals	Higher 1% C (Calm) Q_2 (Self Sufficiency) Higher 5% Q_3 (Controlled) H (Adventuresome)	Higher 1% C (Calm) D (Unrestrained) E Aggression Q_2 Self Sufficiency Higher 5% F Enthusiasm J Passively Individual	Higher 1% I Sensitive Q_4 Tense G Conscientious Q_3 Controlled Higher 5% A Sociable D Timid
Subject Preference	Not Analyzed	Not Analyzed	Higher 1% Science Higher 5% Math	Higher 1% English languages Higher 5% Art
Primary Mental Abilities	Higher 1% Numbers Higher 5% Word Fluency	Higher 1% Space Verbal	None Significant	None Significant

Table 10 Continued

Scales	Urban	Rural	Boys	Girls
Sociometric Ratings	Higher 1% Rejection of others Rejection by others	Higher 1% Choice of others Choice by others	Higher 1% Rejection by others	Higher 5% Choice by others
Culture Fair	Higher 1% level Matrices	None Significant	None Significant	None Significant
Motivation Battery	Higher 1% level Make things More rest and holidays Higher 5% level Mother there Face and Figure Science Fiction	Higher 5% level Self Control Reputation U.S. beat enemy	Higher 1% level U.S. beat enemy Science fiction Get even Self control Higher 5% level Safe at home	Higher 1% level Face and figure Pray God Teacher like me time Boy friend Nice clothes Higher 5% level Worship God Polite to adults Time with friends

The relationship of each of the measure variables with the different criteria of school success should be worthy of study, However, since many bore no near significant correlation to the criteria, Table 10 has omitted them as being irrelevant. The criteria of Behavior Record and Social Adjustment have also been added to Achievement since these are also important goals toward which schools in our country strive.

It will be noted that lack of restraint seems to be rewarded in the rural sample in a way diametrically opposed to what the results show for the urban group.

Table 11 shows the correlations between the ability measures and the three criteria of school success. The strong positive influence of verbal ability suggests that this is the most important ability for school achievement and shares with fluency and reasoning importance for behavior and social adjustment. Since all of these dimensions involve primarily teacher's rating, the close relationships which they bear can be assumed to be due partially to the halo effect. Thus the correlations of ability variables with rated behavior and rated social adjustment may reflect to some degree the individual teacher's bias, i.e., she would tend to see the academically achieving student as successful in other relationships as well. The variations in the values in the expected directions suggest that the results do reflect considerable variance not directly related to this phenomenon.

The sociometric measures show that the choice rejection ratio directed toward the child is more significant in terms of his success than is his own choosing behavior. A notable exception to this general observation is the significant positive relationship in the urban sample between rejecting others and academic success. This might be looked upon as an urban sophistication or at least the development of more critical evaluation of their classmates. In the rural sample the rejection of others has a near-significant negative correlation with both Behavior and Social Adjustment.

Table 11

Correlations of Ability and School Success

	Academic Achievement		Behavior Record		Social Adjustment	
			(Teacher Rated)			
	S	P	S	P	S	P
Primary Mental Abilities						
Verbal	62*	62**	10	38**	27**	36**
Space	34**	30**	12	08	30**	14
Reasoning	42**	39**	20*	35**	30**	38**
Number	42**	31**	10	25**	26**	20*
Word Fluency	40**	44**	10	18*	36**	28**
Culture Fair						
Series	46**	29**	11	15	22**	23**
Classification	29**	20*	-06	02	10	13
Matrices	51**	35**	01	34**	14	27**
Topology	26**	20*	08	13	21**	24**
Total	54**	33**	05	24**	23**	31**

* Significant at .05 level.
** Significant at .01 level.

The motivation tests were somewhat disappointing at this stage. The correlations with any of the criteria were below a .05 level of significance except for submission which was positively correlated to all three criteria. The limitations of the interpretability of the motivation measures as used directly were evident from the uniformity of low correlations. The coefficients could be expanded in proportion to the attentuation due to unreliability. In the cases of these low correlations where true reliabilities have not been calculated, it is unlikely that this process would be justified. Instead it was determined to locate the factor for the variables in oblique hyperspace and work with these values. This will be shown in the next chapter.

Table 12

Correlations of Personality and School Success

Personality Scale	Academic Achievement		Behavior Record (Teacher Rated)		Social Adjustment (Teacher Rated)	
	S	P	S	P	S	P
A Sociability	11	10	11	10	17**	07
B Intelligence	51**	39**	15	20*	28**	15
C Calm Maturity	01	00	-09	-03	08	03
D Lack of Restraint	-07	00	-12	-14	-05	-08
E Assertion, Rebellion	-18	-01	-22**	-11	-21**	02
F Enthusiasm	02	-06	-07	-04	10	12
G Conscientiousness	30**	14	16*	12	21**	04
H Adventurousness	-01	01	11	-01	05	09
I Sensitivity	06	-17*	20*	09	04	-06
J Passive Individualism	03	02	02	-08	-04	-08
O Timidity	-03	-08	-14	-03	-12	-09
Q_2 Self Sufficiency	25**	10	11	00	09	05
Q_3 Controlled	13	07	20*	22*	10	14
Q_4 Tense	-02	-02	05	-01	-03	-12

* Significant at .05 level.
** Significant at .01 level.

Table 13

Correlations of School Success With Dynamic

Structure Factors As Direct Scores

Drive Factor	Academic Achievement		Social Adjustment		Behavior Record	
	S	P	S	P	S	P
Curiosity	-12	-06	-04	04	-10	-18
Fear	-01	05	-05	-02	-06	07
Pugnacity	-28	-09	-15	-10	-21	-08
Gregariousness	-02	-01	05	02	08	04
Assertion	-02	-06	-14	-12	-07	-02
Religion	07	11	10	10	14	07
Submission	20*	17*	09	16	15	22*
Self Sentiment	06	04	-02	-04	05	02
Super Ego	06	12	-00	08	-00	10
Narcissism	06	09	08	00	04	10

Table 13 Continued

Drive Factor	Academic Achievement S	Academic Achievement P	Social Adjustment S	Social Adjustment P	Behavior Record S	Behavior Record P
Sex	-02	-07	06	-04	-02	-09
Acquisition	11	-06	03	02	00	04
Protection	-06	-16	-01	-06	-03	-08
Construction	04	.08	-02	-02	10	-07
Sensuality	-05	06	04	11	-01	14
Play Phantasy	02	-13	-01	-06	-05	-01

Note *. These values were calculated from averaging the correlation between the two component attitudes and achievement. It assumes perfect correlation between them and is low to the degree that these two attitudes were actually measuring different areas of the factors. The unreliability of measurement of individual items actually attenuates the results as well.

Table 14

Correlation of Sociometric Ratings and School Success

	Academic Achievement S	Academic Achievement P	Behavior Record S	Behavior Record P	Social Adjustment S	Social Adjustment P
Rejection of Others	18*	-10	-06	-22*	-02	-20
Choice of Others	02	05	-10	09	00	15
Rejected by Others	-28**	-20*	-32**	-42**	-38*	-37**
Chosen by Others	30**	30**	31**	32**	47**	26**

* Significant at .05 level.
** Significant at .01 level.

Beta Weights for Predictors of School Success

Although the multiple correlations will be examined in a later chapter the individual Beta weights are more appropriately discussed here.

As shown in Table 15, it may be seen that patterns of valence and value are generally followed between the urban and rural samples and that these are analogous to the correlations between the individual measures of the predictors and criteria with a few notable exceptions, as would be expected

because oblique factors make agreement unlikely. The largest uniform predictor of academic achievement among the personality variables is contributed by C, Calmness; F, Enthusiasm; E, Submission; I, Toughness; and Q_2, Self Sufficiency. The G, Conscientiousness, is unexplainably low in contrast to its high correlation as a single predictor. There seems to be a significant split in the behavior of D, Lack of Restraint, or Assertion, between the urban and rural sample. The rural children seem to make positive use of their assertion in their achievement while the urban sample seems to show this variable as a liability.

Table 15

Beta Weights For Predictor Variables*

In Relation To School Success (N = 154)

		Academic Achievement		Social Adjustment		Behavior Record	
		Urban	Rural	Urban	Rural	Urban	Rural
Personality:	A	+123	+076	+167	+091	+070	+097
	C	+159	+120	-055	-128	+005	-167
	D	-170	-132	+039	-047	-180	-134
	E	-153	-114	-071	-095	-073	-116
	F	+197	+182	+116	+080	+173	+102
	G	-012	+038	+226	+250	+149	+097
	H	-178	-107	-165	+005	-136	+049
	I	-071	-126	-030	-131	-059	-124
	J	-043	+002	-018	-077	-108	-097
	O	+198	+071	-088	-050	-077	+007
	Q_2	+118	+175	+266	+000	+143	+178
	Q_3	+069	+104	+073	+130	+080	+241
	Q_4	-198	-031	-064	-036	-202	-077
Abilities:	PMA Verbal	+403	+481	+208	+186	-006	Results
	PMA Spacial	+048	+106	+160	+027	+107	Unavailable
	PMA Reasoning	+035	+128	+111	+266	+213	
	PMA Numerical	+126	+074	+116	+014	-028	
	PMA Fluency	+034	-013	+028	+125	+037	
	Culture Fair "G"	+291	+102	-004	+059	-084	

*** When used in batteries consisting of personality tests alone or ability tests alone.**

For adjustment and behavior purposes a different group of predictors are most responsible. Factor A, Cyclothymia; E(-), Submission; F, Enthusiasm; G, Conscientiousness; J(-), Toughness; Q_2, Self Sufficiency and Q_3, Controlled. The ambiguous variables in this realm are Q_4, Ergic Tension, and D, Lack of Restraint. The rural sample favored low ergic tension (Q_4) while urban group showed greatest restraint (D-).

The pattern of beta weights for the abilities follows very closely that of the raw correlations. The distinction lies in the clearer importance of reasoning power upon both behavior and social adjustment and the supreme importance of verbal ability upon academic achievement. The fact that "G" should be second in weight reflects the relative unimportance of other abilities, which are included in "G", to the criteria.

No marked urban-rural differences were noted in the beta weights. General trends can be noted, however, which indicate.. that.

Summary

An urban sample of 153 seventh and eighth grade children and a rural sample of 124 children of the same age group were tested on the same personality, interest, ability, and achievement variables. The variables of each were intercorrelated and multiple R's were calculated with the resultant beta weights. In this chapter the individual predictor variable correlations with three criteria of school success were studied. The beta weight patterns were also examined to ascertain the independent variance which each variable seemed to contribute to the multiple prediction of the criteria.

Among the personality variables, C, Calmness; D(-), Restraint; E(-), Submission; F, Enthusiasm; G, Conscientiousness; I(-), Toughness; Q_2, Self-

Sufficiency, and $Q_4(-)$, Relaxed, seemed to correlate most highly with the three criteria studied. Verbal and General Ability were most correlated with academic achievement but reasoning exceeded verbal ability in predicting success in behavior or social adjustment. The motivation variables were relatively unsaturated at this point, but showed distinct relationship between submission and academic achievement and good behavior. The sociometric ratings showed the chosen children to be high on the three criteria. There is a slight indication that achieving urban children reject others more than the rural children achievers.

Chapter 4

ABILITY, PERSONALITY AND MOTIVATION RELATED, AS PURE FACTOR CONSTRUCTS, TO ACHIEVEMENT

So far the only substantial disappointment in our investigation had been obtaining sufficient definition of the dynamic structure factors without gaining sufficient capacity to measure them reliably. It is true that the relations of the raw score interest factor measures to the criterion do show more than a chance number of significances which, if expressed in mean differences rather than correlations, might be considered impressive. However, our interest is in the structure of the correlations, since these lead to more comprehensive theoretical views so a means was sought to bring the dynamic structure factors more definitely into the correlational system.

The possibility of doing this resides in a procedure we had already aimed to carry out for other reasons, namely, to make a complete factor analysis of the 110 variables covering most of the data gathered. The aim here, as stated, was (a) to check that the assumed ability, personality, etc., factor structure exist--a matter of little real doubt in the case of the 6 Thurstone Primary ability and 14 High School Personality questionnaire factors, but needing a check in the case of interests,[1] and, (b) to check the extent to which the a priori concepts of ability, personality and interest modalities really do represent distinct sources of variance and new factor spaces.

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[1] The structure of interests in Chapter 2 was based on the Springfield sample alone. It could now be re-checked by fresh analysis and rotation on the total sample.

Some thirty to forty factors might be expected, from existing psychological knowledge, among these 110 variables and, if, as explained in a moment, the simple structure would give exact angular relations among them, the latter could be transformed to correlations representing the relations to the criterion of factors measured without unreliability, i.e., as pure factors.

Apart from the ordinary difficulties of handling so large a matrix, many studies of this size would have to be abandoned for failure to meet statistical conditions. In this case, however, the study is in good shape as far as such limits are concerned. The number of individuals in Springfield and Paxton combined (277) is more than twice the number of variables, and the number of variables is more than twice the largest number of factors that might be expected, psychologically, to be at work.

Since two variables is the bare minimum to mark a factor, it would have been preferred to represent each postulated factor by, say, three variables. But:

6	Primary Abilities	x	3	=	18
1	Culture Fair "g"	x	3	=	3
14	Personality Factors	x	3	=	52
16	Interest Factors	x	3	=	48
4	Achievement Variables			=	4
		Total			125

already overshot the capacity of the Illiac computer (110 variables) even without any of the rating and self rating variables. Accordingly most factors were hypothetically marked by only two variables and one or two of the less clear interest factors were dropped so that the 110 variables finally factored were as follows in Table 16.

Product moment correlations were computed now from raw scores on the 277 children already described as the sample in Chapter 3. This matrix is given in Appendix 5.

Table 16

The 110 Variables Used For Determining Factor Structure Across Modalities

Since the variables used have been listed in several tables throughout, it seems sufficient to here list the order of variables, and the table in which the listing may be found.

1.	Sex	
2.	Populace - Urban or rural	
3 - 9.	Teacher Rating	Table 4 (a)
10 - 17.	Student Interest	Table 4 (b)
18.	Achievement Quotient	
19 - 32.	HSPQ - Form A	Table 8
33 - 46.	HSPQ - Form B	Table 8
47.	Teacher ratings on subject preferences - Mathematics.	
48.	" " " " " - Science.	
49.	" " " " " - Language.	
50.	" " " " " - English.	
51.	" " " " " - Art.	
52.	" " " " " - Music.	
53.	" " " " " - Geography.	
54.	" " " " " - History.	
55.	PMA - 'odd' Verbal.	
56.	" - 'even' Verbal.	
57.	" - 'odd' Space.	
58.	" - 'even' Space.	
59.	" - 'odd' Reasoning.	
60.	" - 'even' Reasoning.	
61.	" - 'odd' Number.	
62.	" - 'even' Number.	
63.	" - Word Fluency.	
64 - 67.	Stanford Achievement	Table 6
70 - 73.	Sociometric measures	Table 14
74 - 78.	Culture Fair	Table 9
79 - 94.	Interests	Appendix 1 (a)
95 - 110.	Interests, summated	Appendix 1 (a)

Great care was taken in the centroid analysis to get the best evidence as to the number of factors, two checking tests, as usual, being applied. The Tucker (1938) criterion indicated the early thirties and the Guttman pointed to 36. Communalities were then twice iterated on 36 factors and this 36 factor centroid matrix (Appendix 6)was first given the greatest possible shift toward simple structure by an analytical program--the Oblimax program of Saunders and Dickman (1961). This has proved the best analytical program in our experience and rotates to simple structure permitting the axes to go oblique, which is a necessary condition for true simple structure.

However, as usual, the analytical program result required further visual rotations, which were undertaken by Rotoplot (1962). Each over-all rotation involved $\frac{36 \times 35}{2} = 630$ photographs, each to be inspected for rotational possibilities. As far as we know this is the largest matrix ever to be rotated for simple structure, and it proved to be quite the most laborious and difficult part of the whole research.

After three such over-all rotations, taking two months, the resulting C_R matrix, i.e., the correlations among the reference vectors, was submitted to matrix inversion to get C_F, the correlations among the factors. It was then found, from the difficulty of inversion that some vectors had been moved almost into the plane of others, sufficiently to make the matrix ill-conditioned for inversion. Since no previous work had been done on such large matrices some time had to be taken pioneering with the special problems involved. It became evident that the need for accuracy in rotation in larger matrices increases roughly as the squareof the number of variables, i.e., rotation becomes an altogether larger feature of factor analytic researches than has previously been recognized.

On the other hand, the presence of 110 variables makes it very probable that simple structure rotation can be carried to a high degree of accuracy--high enough to give determinations of angles which can reliably be used as a basis of determining correlations between one factor and another and any factor and the criterion factor or factors. Accordingly we persevered through seven further months of rotations eventually reaching a simple structure which was virtually unimprovable.

The rotated matrix showing the structure simultaneously for ability, personality and interest variables used is shown in Table 17. The C_R matrix thus reached after nine over-all rotations inverted quite easily and gave us the C_y matrix,

$$C_y = DC_R^{-1}D$$

which is set out in Table 17. Doubtless this could be still further slightly improved upon, but the percentage of 82% in the ±.10 hyperplane at this point is probably a record in factor analytic experiment. However, the C_R is also included (Appendix 7) in order that later researchers may take off from our exhaustion point if they wish.

It will be seen that the meaning of the factors through this simple structure resolution is almost exactly that which had been hypothesized from past psychological work. The personality factors in the HSPQ prove to be 14 in number and to pull together in each case the two variables (A and B forms) believed to mark the factor. Similarly the Thurstone primary abilities show their independence, while the structure in the interest-motivation area is very similar to that found in the exploratory study with the fraction of the present sample used in Chapter 1.

The criterion variables might have formed some more complex picture, but in this broader context that which is learned in school behaves like a single role factor and enables us to handle scholastic achievement as a single concept and a single criterion. (It would, of course, require diverse weightings for the different subjects, empirically determined here, if estimated from grades.)

For ease of inspection the correlations of the three classes of predictors with the criterion itself have been abstracted from the large table and set

Table 17

Simple Structure Rotated Factors From All Variables Together
(110 Variables, 277 Subjects)

1	-02	-08	05	04	02	-02	08	02	-44	-01	00	07	-13	-01	-07	08	-07	07	07	00	21	-01	05	12	05	01	17	-05	-01	-03	-02	-00	-05	03	-10	-00
2	04	14	-18	-04	-06	-10	04	-00	-08	-02	02	04	-09	-04	-07	-08	-09	08	06	-05	-10	04	-02	24	-08	03	07	04	00	06	-10	33	10	02	04	40
3	-02	07	-08	-20	-13	12	02	-02	-04	06	34	-05	-01	-05	07	-03	-03	07	02	-00	08	40	02	00	-07	02	06	-02	-04	-03	05	11	05	04	-01	05
4	01	12	00	-09	-10	02	01	08	08	-08	28	-02	01	-06	01	-06	05	-04	-00	04	09	38	-11	00	03	-04	05	-02	-00	-03	06	01	03	14	-06	08
5	-02	11	-09	07	-12	-02	-02	06	-10	-06	01	-02	15	03	03	-03	-04	08	03	-12	01	12	-09	10	18	05	05	09	30	08	-04	06	-06	05	12	03
6	-05	11	-10	-03	-19	-02	01	13	-10	-15	-03	02	20	04	09	-02	07	-07	02	-01	06	20	-14	05	02	03	-06	02	03	-02	-01	-04	02	09	-00	-02
7	-13	08	-03	01	-06	-13	03	03	10	-14	-10	-05	31	05	03	-07	-03	01	-02	-04	-02	05	04	04	02	-05	-09	-08	21	02	-01	12	06	08	-05	08
8	-07	13	-06	13	-11	01	13	-01	-06	02	-08	00	19	04	09	01	-04	04	-01	11	-03	12	-10	04	-02	09	-03	-09	15	04	-07	04	06	09	03	05
9	-11	14	-03	08	-16	01	11	-10	02	-11	-07	01	20	04	-07	06	03	-07	-07	06	06	04	-08	03	08	01	02	-11	24	13	05	-09	10	20	09	-15
10	-10	-01	-04	-05	11	04	09	-19	06	-06	-28	-11	06	03	10	-01	-04	02	-03	09	-00	-03	-08	13	-02	03	-02	-05	-03	-00	03	04	-00	12	-06	10
11	03	00	-05	-07	25	04	02	-07	-08	02	-19	-17	03	06	-04	-04	-04	05	05	02	-02	11	-05	08	18	-02	-06	-02	-14	16	21	-01	01	-06	-09	03
12	01	-03	-11	-36	00	13	-08	-13	-01	-02	-10	-01	-01	02	-11	14	-09	02	-01	02	02	11	-08	09	-03	-02	-14	03	-10	04	09	-09	01	02	-08	09
13	03	-05	-02	01	21	-06	03	-01	01	06	-41	01	-27	06	05	05	06	01	-03	03	06	58	-01	03	08	01	-02	01	03	-00	-07	01	-01	-03	02	-03
14	05	-05	08	01	09	-03	03	04	03	-00	-31	03	-25	06	-03	-04	-02	-00	04	03	-08	62	04	-01	08	07	-06	-02	02	02	-07	02	-00	-07	-00	-05
15	-05	-13	02	12	11	12	08	07	-01	00	24	05	01	-00	-07	04	02	02	-04	-03	-41	-05	-07	01	06	06	-02	-04	07	06	13	00	-05	06	-22	-08
16	-01	-08	10	07	05	15	08	-01	-04	16	13	-03	02	10	06	-01	-19	09	06	11	-38	01	01	11	13	16	-01	-05	11	16	-06	01	00	-01	-02	02
17	-05	07	11	-01	-15	16	-03	-22	13	01	-06	02	-09	-01	03	02	13	-07	-00	-01	07	-06	02	-02	06	-07	07	-12	08	10	02	-09	19	04	13	-34
18	09	02	-02	01	-04	-00	-02	-01	02	-08	05	12	02	01	10	00	-02	-01	-00	58	01	01	02	04	-00	00	05	02	-01	03	00	00	-01	01	04	02
19	32	04	06	-01	-13	03	02	-01	04	-01	-02	-25	03	-04	00	-03	-01	-06	01	05	04	03	-15	04	-03	02	10	-07	02	08	-04	03	-07	-07	-01	-03
20	04	37	03	01	00	04	00	01	-03	-01	02	00	03	05	00	03	02	10	-01	15	-00	07	02	03	-06	04	-05	-02	-05	01	01	-08	04	01	-03	03
21	12	08	37	-02	-02	10	18	01	-14	01	-10	-15	-22	-03	03	-02	01	-09	04	-07	01	06	-10	-11	10	-00	14	08	08	11	-04	02	-04	-07	07	-10
22	02	-05	-15	10	02	-02	03	04	-18	-16	05	03	-19	23	06	-05	-05	10	-11	-04	-02	-01	02	05	-10	-14	-17	02	-03	-01	17	-02	02	-05	-02	-05
23	-10	09	-09	04	22	03	-14	03	-18	08	07	-07	-04	-00	02	-01	05	-00	-04	-00	01	-01	-01	10	03	-01	-02	-12	00	03	03	-06	06	02	18	-08
24	01	00	-01	01	-03	48	-29	-00	-01	04	03	-14	02	-18	-01	-02	03	03	05	01	03	-03	01	-08	07	-04	-00	16	-04	-01	-14	-04	-09	-10	03	-00
25	18	-13	08	06	-04	-12	45	-05	02	02	-08	06	-02	06	-00	02	05	01	01	07	-21	06	09	10	-06	02	05	-01	-01	-05	-01	-00	04	-10	-02	12
26	08	-09	42	02	03	20	02	18	08	03	-13	11	01	-19	-02	10	07	-05	-04	09	-12	-04	03	-08	-03	-03	12	10	05	-03	-02	-01	-03	-04	-05	05
27	10	06	-09	17	-05	02	05	-01	43	02	03	-03	17	18	-03	01	-04	-02	02	01	-03	-08	00	05	-08	-00	-00	-14	-10	-11	03	-02	-01	04	05	01
28	10	-01	12	-06	11	04	21	-10	-02	31	04	01	02	08	-05	16	-11	07	04	07	02	00	01	11	-03	-05	05	-01	-01	04	22	04	13	-03	04	06
29	-11	-08	-33	03	18	-07	08	11	04	05	16	01	-05	19	00	-09	-02	-03	06	07	04	03	02	02	10	-02	-03	-09	03	14	-04	-05	12	06	03	07
30	01	-03	15	02	04	-12	30	10	-38	07	-02	21	-02	-02	-09	-01	17	-07	-01	13	05	03	-00	-07	03	-06	-02	-01	-09	06	07	-08	-05	12	-02	13

Table 17 (Continued)

31	02 06 21 02-02-20 12 02 19 10 03 06 29-05-02 06-03 01 04 01 07 06 05-00 04-01 08 08-00-02 15-02-13 02 00-03
32	01-05-26 04-06 02-11 04 10-02 03 01-06 39 05 06 05 00-06-05 09 03-06 11-09 01 03 08 05 02 12 07-05-04-04-05
33	37 04 05 02 02 04 07 03 10 02-01 00-02-15-03 06 04 05-00-05 02 01 02-26 02 01-01-02 07-02 09-03 00 09 01 00
34	05 09-10-12 02-02 06-03-05-11 04 07-11-01 04 04-03 14 04 05-07-04-05 12-04-06-07 03 21-02-02-09 06-12-01-13
35	12-01 30 08-05-04-03 04 01 00 11 14 05-48 05-01 04 03-11 00 09 05 04 13-02-02-01-05-06-14-02 01 05 01-11 00
36	-05 04-03 30 07 17-17-04-08-02-05 14-06 35-04 02 02-00 02-02 05-03-05 04 00 03 10 01-05-04 04 00 07-07-01 04
37	-07 10 23-03 27-14-01 05-05-04-00 04 01 14-02-07-02 06 02-01 04 08-16-01-01-01 01-14 06-07-06 02-05 01-06 01
38	01-02 17 00-03 41-21 02-11-05-10-04-03 12 03-04 00 02-06 01 06 07 09 11-23 02-00-05-02 03 05 06 01-00-11 01
39	11 17-07-07-08 02 42 01 03 20-11 05 06-06 03-02 03 02 00-03 06-07-08-10 09 04-06 05 01 02 01 02-03 04 00-04
40	10 08 16 18-07-05-07 21 10-02-05-10-05-27 05 06-05 02 01-11-01-01-09-00-08 01-01 07 03-00-01 05-02 08 03-02
41	-08-01-22-13-03-07 04 04 43 02-13 05 06 01 03-06 03-03 06-05-02-02-01-07 09-04 03-04 09-03-07-02 01-03-09-11
42	-08 09-33-02-15-02 01 05 09 27-04 10 02-17-03-03 03 04-00 00-05-05-04-03 14-04-00 13-17-01 07-10-07 14 16-06
43	-21 01-35-02 02-07 02-08 05-01 30 04-07 08 05 03 02-01-05-04-04 07-02 09-01 00 03 09 04-02-07 01-05-08-02-04
44	24 04-06-01-01-05 02 06 03 05-01 35 00 01 02-04 06 04 00-03 01 02-01 01-05-01-01-01 22-07-04-08-05-04 01-02
45	15 03-01 02-01-05 11 07 03-05-11-01 21-02-03 04 15-04-04 05-03-13-04 07-10-00-07-21-08-22-00-05-02 11 00 03
46	-01 05-10 03 02 02-02 04 08-04-08 17 01 34 03-16-03-01 05 01-03 08 14 03 10-06 04-14-05-04 04 08-21-20 07-14
47	07-09 08 03 10 05-03 08 09 08 01 08-15-03-07 07 03 13-00 16 06 00 09 25-06 09 18-07 13 35 10 32 05-03-08 22
48	11 14-02 02-05 09 01-07-41 29-04 16 07 05 04-07 05-08 04-03 01 03-01-00-07 04 07-03 01 02 07 04-04-07-02-06
49	01 03-07 05 01-22 04-32-00-01-00-40 06 02 06-02 10 02-06-05-07-00 14-02-03 00 03 05 02-08 01-07 04 03 07-10
50	-10 02 15-14 04-03-14-11 05 09 01-03 27 10 08-10 11-03-03 03-05-03-14-17 03-00 01-01 05-07 00-26-03-12-14-17
51	-02 14-04 00-04 02-03-04 07-12-05-02-32 07-04 03-01-07 05-09-32-07 04-21-02-15 02 08-12-14-03-04-01 17 01 21
52	06 01-10-24-05-00 02 31 03-06-10 10-11 17-00 05 00 05-03-02 04-02 05 04 05 04-03 13-01-24-14-05 04 02 05-01
53	02-31-02 02-06 06 03 01 01-20 07 03 15-21-02 02-23 05-03 15 00 05 00 02-02-09-17-07-13-05 05-01 08-00 02 03
54	-05-03 04 21 02 05 04-06 11-09 02-07-00-12 02 04-10 05 07 04 22 00 04-10 01-02-04-07 02-04 04-11-06 04 20-35
55	-01 02 02 03 03 02 04 01-01 02-00-04 01 04 50 04 03-02 01 02-03 02 02 30 02 03 02-03-02-00 02-03 06 03 03-02
56	00 02 05-01 01 03-04 01 05-01-02 04 02 02 64-01 01 02 02 00 04-01 01 01 01-02 02 01 03 01 03 05-02 02 00-02
57	-03 03 02-00 01-00 05 05 00 05-04-04-02 04-05 70 00 03 03 03 02 05-03 05-00 05-03 04 05 02 01-05-03-04 01 01
58	01-00-01 01 00 03-06 01-00 02 03-02-04-02 03 73 03-04-01-00 02-01-01-03 04 01-00-04 00-02 02 02-00 03 01 05
59	-02 01 03-03-06-01-01-04 03-02 01-01 04 03-01-05 60 05 06 01 02 01-02-01 03 05 03-01-01 05-02 01 00 01 01-03
60	04 01-00 06 09 05 08 05 00 01-03 02 03 01 02 04 59-00-03-01-03 01-00 05-02-05-01 02 05-03 04 03 04 06-02-00
61	03-03 03-01 01-00 02-01 04 03 02-03-00-01-01 02-05 67 06 01-04 03 01 04-00 02-00-02 03-02 05-02-02-02 06 03
62	-03 06 01-00-05 04-00 05-01 02-03-01-04 00-00-04 05 68-05-02 04-01-02-04 02 01-02-02 02 03-04-02-01-00-04 02
63	-08 03 06-08-06 04 09-07-00-06-03-12-05 08 18 04-03 19 04-03 03 05-20 01-16-03 03-08-09-01 07 07 10-05 15-08
64	16 04-06 04 05 00-03-01-06-05 01 16-01-01 16 03 00-09 05 45 07-04 07-01 06 04-01 07 05-01-04 05 04 04-01 10
65	05 11-03 07 06-00 05-07-06-05 03 13 01-07 18-05 03-10-06 45 02-05 01 05 00 01 02 05 03-04-09 03 12-07 01 03
66	02-05-07-00-12 06 03 00-00 02-03 05 01 01 16-05-07 07-04 40-11 04-11-01-07 03-03-03-03 04-03 07 03-05 05-05
67	00-02-03-05-15 01-01-05 06 01 01-04 01 05 08 01-05-01 04 46-02 03-15 05-06 02 04-02-01 06-02 02-02-02 12-07
68	-07-10 05-01 14-02 05 05 03-06 01-03 09 01-05 05 02 06 07 55 01 04 03-07 12-01 10-03 04 00 07-00-04 08-03-08
69	-09-09 08 04 12 05 11 00-00 06-04-08 05 01-04 04 09 09 02 39-04 04 04-24 06-01-06-02 04 03 14-02-00 08-01-20
70	05-07-00-30-02-04 06 10-04-01 02 09-06-01-02-07 10 01-01 04-04 06-01 06-04 03-02 07-07-02 07 11-05-01 39-05

Table 17 (Continued)

71 -11-07 01 25-14 14-09-23 04 23 02-06 00 00 08 09-10 08-06 06 07 10 02-05-03 19 01-00-07 01-06-05-06 06-09 02
72 02 07-04-16 14 03 08 15 03 01 16-12-04 02 06-07 00 01-01-01 02-06 22-07-17 11 27-02-09-01-04 17 14-00 08 04
73 -06 02 16 08-22-00-06-30 01-01-10 12-07-02-03-08 05 03-00 04 05 19-11 08 10-01-29 03 06 01-03-10-01 05-14-03
74 06 02 13 01 02-04 07-11 11-09-01-00-11-00-02 02-05-02 48-02-01-01-05 04-00 02 06-02-04-07 17-07 01 07 06 03
75 -03-03 05-04-03 10-02 05 09-12 03 05 05-00-02 06 01 00 42-01 10 09 00-02 01 02 07-01-01 05-14-05-10-07-21 13
76 07-09-03-04 20 03 16 00-07 05 11-04 05 01-01-00 06 00 54 04-01-02 02 01-04-01-03 08 12 06-02 11 06-06 09 19
77 -12 05-13 04-06 10-10 19-02 12-16 09 01 00 05-03 00 01 39-00 02 01 07 00 17-03-03-03-01-01 07-07 08 07-10-17
78 00-03 02-02 03 04 01 00 03-03-02 01 01-01-01-04-04 00 80-03 03-01-00 01 04 00 02-01 01 02 06-02 02 01-04 07
79 12 06 02-02-14-11 03-02-07 04 05-04 12-05 03-06 04 10 02-14 03-06-09-03 07-01-18-01 01 35 03-10-03-07 05 03
80 07 11 16 04 02-04-07 23 04-06-03 07 06 02 03 06 04-05-08 08 03-02-01 04 01-06-00-35-05 09 04-07-10 06-03-13

81 -03 04 07 03 04-15-05-02 07 05 03 11 04 02-07 01 04 08-03 07-10-00-14 17-01 01 08-21 11-11-13 18-01-04 04-04
82 05-10 03 03-05-05-10 05 05 01-04-04 03 02-06 09 08-07-06-02 02-07-07-04-01 01 05-04-09 19-06-08 04-02 39 13
83 -03 11 03-07-09 02 06-00 05-06-03 10-16 08 13 04-09 00 03-04-04 01 04-01 04-07-05 00-06 27-04-06-03 08-02 28
84 00 03 00-10-02 03 01-10-01 00-05-06-01-06-02-04-03-02 05-03-26-00 35-03-05-06 02-02-02-07-04-02-07-14-00-11
85 -12 04 01 01 02-01 00 01-01 01 03 06 00-02-03-06 04-05 02-03 02-04-02 07 42 00 05-09-34-02-02-06 11 03-01 09
86 -07 08 02-10 01 03-05-17 11-05 00 09-10-02 02-13 07 01-04 02 05-05-07 01 04-11-01 10-05-06 06 06 50 04 02 04
87 -08 10 04 04-06 04 20 04-09-08 03-10-10-04 04-06-10 04 07-03 09-00-03-02-05-04-18 03-15-10 01 18-06-09 09-14
88 05 02-02 04-01-10-04-06 01-09-01-02 02 06 03-04-00-00-01-03-03 02 20-05 10 59-01 19 04-06 02 06 06-07 07-03
89 -02-06 10 08 01 06 11 06-11 03-08-04 02 03-05-01 05-05 02 01 04 03 01 15-13 61 03-10 03 03-09-09 16-02 00-06
90 07 06-03 08 17-04 07 06 02-07 00-03-14 01 05-02-06-03 04 09 02 02-01 03-00 56 01-01 06-04-02-02 06 27-02 12

91 08-06 15-04-06-03 00-07-03-07 03 01-05 19 06-02-13 07-01 04 02-03-04-01-03-05 16 05 00-14-02-03-01 06-03 15
92 -00 20-01-07 12 11 04-08 09-00-01-20-06-00-02-05-04 03 02 02-07-06-03-04 06-18-04-05-03-04-01-13-00 09-03-02
93 -02-03 07-03-04-03-02-07 00 02-02-06 01 07 01 00 05 02-02 02 10 01-01-03 05-04-04-00-00-03 04 14-07 08-03 08
94 01-02-04-02 14 00-01-07-02 03 07 07 01-06 01 04-01 05-05-00-10-10-15 02-07-02-09-09 32-06-30 03-19 01-12 05
95 -04-07-17 02-17-09-02 01-03 03 10-09 15-04-03-05 09 04 03 02 03 01-04-05-10-04-04-06-11 17 19-02-04-01-15-13
96 -07 06-06 00 14 27 01 13 15 33-03 01 06-08 07 11 04-09-06 02-06 03-05 02-01-02-04-06 05-04 01 22 07 02 17-05
97 28-03 01 04 01-02-06-02-04-04 05 05 02 08 02 04-05-01-03 01-02-04 07 05-04 04 00 12-01 04 14-01 04 03-03-07
98 -05-08 02 05 01-03-10 10 04-13-00 05-01-04-04-01 08-06-01 05 04-04 01-18-15-06 10 23 31 04 03-07-02 08-28 01
99 01-03-03 13 07 03 02 05-01-07-03-02 03-02 03 02 13-04 06-05 18-03 07 14 07-01 01 07-14-05 10-11-07 05 08 07
100 -08-02 09-14-00 13 05-01-00-01-01 08 05-00 02-00-00 04-05 11 06-05 23 03-10 60-10-11-01 04 07-03-01 23-02-02

101 -03 11-11-07-03 04 03 07 07 07-06-03-07 06 05 00-05-02-03-03-06 06 01 02 15 60 01 01 08 12-03-02-10 04-00-05
102 13 14 00 02-00-00-21-07 02-03 09 03 10 05-07 09-01 00 00-00-09 01 07 00 11 59 06-02 01-16-00 01 09 06-00 04
103 -01-07-14 05-02-03-04 06-00 08-05-03 08 05-05 02-14 04 08-02-05 12-11-07-01-02-02-00-08-04 07-07 35-10-02-03
104 -14-10 02-05-04-24 02-07-11-03-04 01-03-04 02 07-01 05-01-03-10 10 13-08 29 02-03-15-12-01-07 11-10-02-03-04
105 -04 05 02 03-13-04 01-01 05-01-03-02 02 01 00-04 05-08-07 05 04-03-18 00 02-09-06 41 03 01 11-05-23-01-00-00
106 02-02-02 19-10-07 05 06-09 01-02-01-23 03-08 03 07 01 03-10-02 11 01 31 07 06 24-08-03-04 06 01-03-08-06-26
107 13-11-02 04 13 02-13-08-05 01 03 00 02-06 06-01 01 05-03-03 09 06 13-08 03-02-02 12 05-08-03-14-11-01 23 01
108 -10 04-04-00-05-03-09-03 00 08 06 01 12-04-05-05-00-02 01-07-01 09-00-07-35 05 01-10 10-06-03-07-09 25 07-02
109 01 02 01 02 05 15 03 03 07-04-03-03 00 04-04 05-06-09-03-02 05-02-01 02 01 04 09 05 05 04-24-03 12-44 02-05
110 14-11-03 02-00-08 02 08-24-10 23 08 08-05 01 13-02-01 00-01 01-09 02-28-03-02-03-02-04-06-03-03-05 03-01 19

Table 18

Intercorrelations of Ability, Personality, and Interest Factors with

Each Other and with the Criterion of Achievement

(Combined Urban and Rural Sample, N= 277)

HSPQ														PMA					
A	B	C	D	E	F	G	H	I	J	O	Q_2	Q_3	Q_4	Verbal	Spatial	Reasoning	Numerical	Culture Fair	Achievement
+1000	-0301	+0142	-0151	+0478	-0043	+0117	-0364	+0050	-0186	-0104	+0343	+0513	+0178	-0062	+0311	-0222	+0179	+0045	-0283
-0301	+1000	-0197	+0018	-0178	+0193	+0152	+0077	-0140	-0185	-0125	-0027	+0037	-0198	+0316	+0131	+0315	+0195	+0277	+0413
+0142	-0197	+1000	+0077	+0112	-0236	-0199	+0034	-0280	+0144	+0104	-0059	+0102	+0111	-0035	+0090	-0229	-0215	-0060	-0104
-0151	+0018	+0077	+1000	-0009	-0062	-0100	-0010	-0071	+0025	+0047	+0022	-0027	+0036	+0030	+0033	+0034	+0010	+0031	+0075
+0478	-0178	+0112	-0009	+1000	-0147	-0135	-0369	-0178	-0320	-0027	+0601	+0456	+0335	-0123	+0269	-0418	+0084	+0020	-0430
-0043	+0193	-0236	-0062	-0147	+1000	+0241	-0124	+0018	-0359	-0143	-0121	+0044	-0209	+0150	-0021	+0230	+0155	+0136	+0111
+0117	+0152	-0199	-0100	-0135	+0241	+1000	-0206	+0131	-0247	-0195	+0155	+0197	-0290	+0204	+0141	+0215	+0166	+0156	+0147
-0364	+0077	+0034	-0010	-0369	-0124	-0206	+1000	+0011	+0367	+0149	-0329	-0346	-0034	-0150	-0259	+0036	-0200	-0056	+0054
+0050	-0140	-0280	-0071	-0178	+0018	+0131	+0011	+1000	+0143	+0039	-0139	-0046	-0002	-0032	-0137	+0149	-0022	-0065	-0064
-0186	-0185	+0144	+0025	-0320	-0359	-0247	+0367	+0143	+1000	+0231	-0341	-0369	+0115	-0213	-0267	-0072	-0236	-0246	-0039
-0104	-0125	+0104	+0047	-0027	-0143	-0195	+0149	+0039	+0231	+1000	-0056	-0166	+0416	-0167	-0177	-0133	-0164	-0135	-0142
+0343	-0027	-0059	+0022	+0601	-0121	+0155	-0329	-0139	-0341	-0056	+1000	+0465	+0236	-0048	+0322	-0265	+0155	+0171	-0262
+0513	+0037	+0102	-0027	+0456	+0044	+0197	-0346	-0046	-0369	-0166	+0465	+1000	+0131	+0062	+0334	-0166	+0204	+0117	-0253
+0178	-0198	+0111	+0036	+0335	-0209	-0290	-0034	-0002	+0115	+0416	+0236	+0131	+1000	-0191	+0010	-0254	-0046	-0101	-0256
-0062	+0316	-0035	+0030	-0123	+0150	+0204	-0150	-0032	-0213	-0167	-0048	+0062	-0191	+1000	+0233	+0453	+0346	+0366	+0548
+0311	+0131	+0090	+0033	+0269	-0021	+0141	-0259	-0137	-0267	-0177	+0322	+0334	+0010	+0233	+1000	+0054	+0255	+0416	+0082
-0222	+0315	-0229	+0034	-0418	+0230	+0215	+0036	+0149	-0072	-0133	-0265	-0166	-0254	+0453	+0054	+1000	+0320	+0342	+0509
+0179	+0195	-0215	+0010	+0084	+0155	+0166	-0200	-0022	-0236	-0164	+0155	+0204	-0046	+0346	+0255	+0320	+1000	+0271	+0244
+0045	+0277	-0060	+0031	+0020	+0136	+0156	-0056	-0065	-0246	-0135	+0171	+0117	-0101	+0366	+0416	+0342	+0271	+1000	+0360
-0283	+0413	-0104	+0075	-0430	+0111	+0147	+0054	-0064	-0039	-0142	-0262	-0253	-0256	+0548	+0082	+0509	+0244	+0360	+1000
-0335	+0022	+0062	+0052	-0292	-0041	+0017	+0113	-0130	+0167	+0013	-0265	-0411	-0200	-0032	-0094	+0091	-0149	-0123	+0142
+0067	+0202	-0026	+0058	+0028	+0278	+0097	-0162	-0206	-0271	-0113	+0111	+0202	-0150	+0191	+0122	+0061	+0168	+0203	+0110
-0073	-0116	+0229	+0109	-0074	-0279	-0203	+0170	-0063	+0260	+0134	-0066	-0085	+0157	-0246	-0095	-0196	-0217	-0165	-0200
+0319	-0172	+0249	-0195	+0293	-0065	-0120	-0056	-0094	-0011	+0207	+0194	+0241	+0339	-0114	+0053	-0272	-0056	-0042	-0235
-0216	-0037	+0147	+0014	-0425	+0135	-0023	+0103	+0039	+0157	+0037	-0443	-0298	-0128	+0044	-0153	+0165	-0145	-0078	+0207
-0243	+0102	-0131	-0027	-0180	+0061	+0043	+0069	+0194	+0007	-0133	-0165	-0234	-0254	+0069	-0067	+0215	-0113	-0009	+0170
+0131	+0068	-0114	-0010	+0307	-0018	+0165	-0175	-0277	-0310	-0261	+0396	+0275	-0240	-0063	+0174	-0217	+0137	+0035	-0234
+0617	-0186	+0231	-0028	+0668	-0179	+0014	-0332	-0004	-0249	+0000	+0540	+0661	+0405	-0098	+0361	-0350	+0136	+0064	-0336
-0621	+0291	-0196	+0011	-0805	+0263	+0071	+0342	+0127	+0204	-0032	-0644	-0547	-0416	+0208	-0307	+0475	-0065	+0016	+0504
+0595	-0163	+0134	+0022	+0720	-0143	-0006	-0397	-0171	-0315	-0005	+0636	+0564	+0351	-0061	+0367	-0350	+0215	+0067	-0369
-0728	+0302	-0268	+0034	-0705	+0186	+0052	+0356	+0126	+0212	-0074	-0544	-0593	-0470	+0166	-0353	+0414	-0135	-0016	+0436
+0425	-0114	+0045	-0070	+0464	-0022	-0003	-0270	-0106	-0255	-001[illegible]	+0446	+0441	+0305	-0167	+0211	-0305	+0116	+0000	-0330
+0260	-0150	+0165	-0086	+0044	-0067	-0116	-0000	+0026	+0037	+0134	+0085	+0211	+0262	-0090	+0105	-0155	+0056	+0036	-0146
+0720	-0224	+0222	-0042	+0628	-0130	+0015	-0373	-0116	-0265	+0042	+0552	+0643	+0410	-0114	+0366	-0367	+0137	+0096	-0366
-0478	+0200	-0168	+0002	-0386	+0165	+0004	+0246	-0024	-0043	+0054	-0216	-0221	-0189	+0086	-0322	+0163	-0096	-0033	+0206
-0721	+0260	-0279	-0012	-0731	+0144	+0010	+0430	+0132	+0337	-0043	-0592	-0599	-0414	+0097	-0429	+0375	-0141	-0066	+0365

Table 18 - Intercorrelations (contd.)

Achievement	Sex, Male or Female	Sports Interest	Curiosity	Fear	Pugnacity	Gregariousness	Assertiveness	Religion	Submissiveness	Self-Sentiment	Super Ego	Narcism	Sex	Acquisitiveness	Protection	Construction
-0283	-0335	+0067	-0073	+0319	-0216	-0243	+0131	+0517	-0621	+0595	-0726	+0425	+0260	+0720	-0478	-0721
+0413	+0022	+0202	-0116	-0172	-0037	+0102	+0088	-0188	+0291	-0163	+0302	-0114	-0150	-0224	+0200	+0260
-0104	+0082	-0026	+0229	+0249	+0147	-0131	-0114	+0231	-0196	+0134	-0268	+0045	+0165	+0222	-0168	-0279
+0075	+0052	+0058	+0109	-0195	+0014	-0027	-0010	-0028	+0011	+0022	+0034	-0070	-0086	-0042	+0002	-0012
-0430	-0292	+0028	-0074	+0293	-0425	-0180	+0307	+0668	-0805	+0720	-0705	+0464	+0044	+0628	-0366	-0731
+0111	-0041	+0278	-0279	-0065	+0135	+0061	-0018	-0179	+0263	-0143	+0188	-0022	-0087	-0130	+0165	+0144
+0147	+0017	+0097	-0203	-0120	-0023	+0043	+0165	+0014	+0071	-0006	+0052	-0003	-0116	+0015	+0004	+0010
+0054	+0113	-0162	+0170	-0056	+0103	+0069	-0175	-0332	+0342	-0397	+0356	-0270	-0000	-0373	+0248	+0430
-0064	-0130	-0206	-0083	-0094	+0039	+0194	-0277	-0004	+0127	-0171	+0126	-0106	+0026	-0118	-0024	+0132
-0039	+0187	-0271	+0280	-0011	+0157	+0007	-0310	-0249	+0204	-0315	+0212	-0255	+0037	-0285	-0043	+0337
-0142	+0013	-0113	+0134	+0207	+0037	-0133	-0261	+0000	-0032	-0005	-0074	-0019	+0134	+0042	+0054	-0043
-0282	-0285	+0111	-0066	+0194	-0443	-0185	+0396	+0540	-0644	+0636	-0544	+0446	+0085	+0552	-0216	-0592
-0253	-0411	+0202	-0085	+0241	-0296	-0234	+0275	+0661	-0547	+0564	-0593	+0441	+0211	+0643	-0221	-0599
-0258	-0200	-0150	+0157	+0339	-0128	-0254	-0240	+0405	-0418	+0351	-0470	+0305	+0282	+0410	-0189	-0414
+0548	-0032	+0191	-0246	-0114	+0044	+0069	-0083	-0098	+0206	-0061	+0186	-0167	-0090	-0114	+0086	+0097
+0082	-0094	+0122	-0095	+0053	-0153	-0087	+0174	+0361	-0307	+0367	-0353	+0211	+0105	+0368	-0322	-0429
+0509	+0091	+0061	-0196	-0272	+0185	+0215	-0217	-0350	+0475	-0350	+0414	-0305	-0155	-0387	+0183	+0375
+0244	-0149	+0168	-0217	-0056	-0145	-0113	+0137	+0136	-0085	+0215	-0135	+0116	+0056	+0137	-0096	-0141
+0360	-0123	+0203	-0185	-0045	-0076	-0009	+0035	+0084	+0018	+0087	-0016	+0000	+0038	+0098	-0033	-0068
+1000	+0142	+0110	-0200	-0235	+0207	+0170	-0234	-0338	+0504	-0369	+0438	-0330	-0146	-0388	+0206	+0365
+0142	+1000	+0007	+0150	-0156	+0269	+0129	-0068	-0413	+0364	-0407	+0377	-0257	-0145	-0390	+0166	+0368
+0110	+0007	+1000	-0185	+0008	-0034	-0056	+0155	+0044	+0017	+0078	-0040	+0112	+0028	+0129	+0014	-0075
-0200	+0150	-0185	+1000	+0101	-0022	-0103	-0042	-0008	-0073	+0005	-0069	-0033	+0022	+0027	-0033	-0006
-0235	-0156	+0008	+0101	+1000	-0085	-0215	-0057	+0402	-0369	+0330	-0440	+0244	+0247	+0443	-0141	-0419
+0207	+0269	-0034	-0022	-0085	+1000	+0112	-0303	-0384	+0447	-0456	+0368	-0275	+0031	-0332	+0167	+0365
+0170	+0129	-0056	-0103	-0215	+0112	+1000	-0085	-0313	+0293	-0324	+0398	-0317	-0211	-0367	+0082	+0324
-0234	-0068	+0155	-0042	-0057	-0303	-0085	+1000	+0157	-0302	+0302	-0171	+0240	-0083	+0209	-0052	-0201
-0338	-0413	+0044	-0008	+0402	-0384	-0313	+0157	+1000	-0793	+0739	-0823	+0543	+0308	+0804	-0440	-0825
+0504	+0364	+0017	-0073	-0369	+0447	+0293	-0302	-0793	+1000	-0807	+0856	-0558	-0219	-0767	+0476	+0840
-0369	-0407	+0078	+0005	+0330	-0456	-0324	+0302	+0739	-0807	+1000	-0790	+0545	+0220	+0765	-0427	-0802
+0438	+0377	-0040	-0069	-0440	+0368	+0398	-0171	-0823	+0856	-0790	+1000	-0586	-0334	-0855	+0470	+0882
-0330	-0257	+0112	-0033	+0244	-0275	-0317	+0240	+0543	-0558	+0545	-0586	+0999	+0151	+0614	-0239	-0557
-0146	-0145	+0028	+0022	+0247	+0031	-0211	-0083	+0308	-0219	+0220	-0334	+0151	+1000	+0336	-0157	-0309
-0388	-0390	+0129	+0027	+0443	-0332	-0367	+0209	+0804	-0767	+0765	-0855	+0614	+0336	+1000	-0408	-0855
+0206	+0166	+0014	-0033	-0141	+0167	+0082	-0052	-0440	+0476	-0427	+0470	-0239	-0157	-0408	+1000	+0482
+0365	+0368	-0075	-0006	-0419	+0365	+0324	-0201	-0825	+0840	-0802	+0882	-0557	-0309	-0855	+0462	+1000

out in Tables 19, 20 and 21 below.

Table 19

Relations of Abilities With The Achievement Factor

Ability Factors	Correlation With Achievement Factor
Verbal	+.55
Space	+.08
Reasoning	+.51
Number	+.24
Culture Fair	+.36

The largest contribution is clearly from the verbal and reasonning factors, implying that most school subjects are most affected by these. The fact that these exceed the general (culture fair) fluid ability factor suggests that the specialization in the Thurstone primaries is one of scholastic skills acquired, not of basic ability as such.

Table 20

Relations of the Personality Factors With the Achievement Factor

Personality Factors		Correlation With Achievement Factor
(A)	Cyclothymia	.28
(B)	General Intelligence	+.41
(C)	Ego Strength	-.10
(D)	Excitability	+.75
(E)	Dominance	-.43
(F)	Surgency	+.11
(G)	Super Ego Strength	+.15
(H)	Adventuresomeness	+.54
(I)	Sensitivity	-.64
(J)	Neurasthenia	-.39
(O)	Guilt Proneness	-.14
(Q_2)	Self Sufficiency	-.28
(Q_3)	High Self Sentiment	+.25
(Q_4)	High Ergic Tension	-.26

The first finding which strikes one here is that the correlations are essentially of the same order as for abilities. As a confirmation that this is in no way artifactual, the r of .41 for the general intelligence factor included in the HSPQ is just about what one would expect from the alternative instruments in Table 19 above. Hitherto it has not been possible to measure personality factors as validly as ability factors, but the present "pure factor" approach suggests that when this becomes possible the prediction from personality questionnaire scores will rise from that attained in Chapter 3 to values quite as important as those for abilities.

In terms of the specific factors involved, the correlations with A(-), schizothymia; E(-), docility; F, surgency; G, super ego; and with H, I, J, O, Q_3 and Q_4 fit the theories and preliminary findings previous stated in the HSPQ Handbook (1960); but C, D, and Q_2 behave anomalously. For ego strength, C and Q_2, self sufficiency have, with adults tended to be significantly positively related, and D, excitability, would hardly be expected to be positively related to scholastic achievement. However, the verdict of further experiment at this age level must be awaited.

Table 21

Relations of Motivation Factors and The Achievement Factor

Drive Factors	Correlation With Achievement Factor
Curiosity	-.20
Fear	-.24
Pugnacity	+.21
Gregariousness	+.17
Assertion	-.23
Religion	-.34
Submissiveness	+.50
Self-Sentiment	-.37
Super Ego	+.44
Narcissism	-.33
Sex	-.15
Acquisition	-.39
Protection	+.21
Construction	+.36

7

It is interesting that these correlations, even when freed from error attenuation by the pure factor approach, do not quite reach the same average level as the others. Nor do they agree as well with the directions of sign for the direct score correlations in Chapter 3. Only the two largest correlations, positively with submissiveness (docility) and with super ego strength, agree clearly with the raw score results, with evidence from the independent measurement in the questionnaire and with general psychological understanding.

Since with oblique factors the correlations (factor structure) with the criterion and the weights (factor estimation) are not the same, the beta weights for estimating achievement from the ability, personality and interest measures are set out separately in Table 22.

Table 22

The Beta Weights For Pure Factor Predictors In Relation To Achievement

		Batteries Alone	Personality & Ability	All Predictors Together
Personality (HSPQ)	A	+047	+008	+059
	B	+340	+184	+177
	C	+011	-006	-043
	D	+073	+041	+040
	E	-339	-263	-237
	F	-092	-098	-142
	G	+069	+026	+021
	H	-136	-073	-069
	I	-078	-086	-167
	J	-132	-042	-027
	O	-102	-064	-068
	Q_2	-115	-116	-040
	Q_3	+196	+191	+157
	Q_4	+022	+034	+010

Table 22 Continued

	Batteries Alone	Personality & Ability	All Predictors Together
Motivation (Objective)			
Curiosity	-146	Not Included	-083
Fear	-066		-000
Pugnacity	-016		+015
Gregariousness	-019		+029
Assertion	-113		-155
Religion	+154		+186
Submission	+578		+225
Self Sentiment	+082		-048
Super Ego	+179		+035
Narcism	-090		-026
Sex	-058		-053
Acquisition	-089		-156
Protection	-004		+024
Construction	-267		-190
Abilities			
PMA Verbal	+381	+321	+268
PMA Spacial	-085	-000	-002
PMA Reasoning	+292	+075	+009
PMA Numerical	-005	+076	+109
Culture Fair "G"	+149	+166	+164

It will be seen that when all the kinds of individual differences are combined (Column 3) the weighting is fairly widely spread, but ability and docility are still the leading contributors. Roughly, in sum, abilities personality traits and interests are independent and equally important.

The multiple correlations will not be examined here, but will be left to discussion in the final summary, in Chapter 6. Of the approach to the problem through the technique of the present chapter, which eliminates the effect of poor accuracy of estimate of factors from raw scores, but requires high skill and much labor in determining oblique simple structure, it can only be said that it is promising. This cautious judgment is based on the fact that (1) it can be realized with large matrices without prohibitive inversion difficulties (2) with many variables the simple structure should be unambiguous and (3) the results are reasonably in agreement with those of other approaches. However, the only satisfactory evaluation of the method will come from comparing results with a repetition on another sample and an independent rotation.

Chapter 5

IMPROVEMENT OF THE OBJECTIVE TEST MEASUREMENT OF DYNAMIC STRUCTURES

Although Chapter 2 showed that dynamic structures in child interests, measured by new objective devices, could be clearly demonstrated, Chapter 3 proved that as yet they were not being reliably measured. Chapter 4 gives reasonably prior evidence that _if_ they could be reliably measured they would be on a par with ability and personality measures in a trio of areas of equal importance for achievement prediction.

Accordingly, we set up, in the closing stages of our research, a small special study, reported here, in the hope of clarifying the possibilities of reliable interest measurement for future researchers who choose the objective, i.e., non-self-evaluative approach.

The aim was to reduce slightly the representation of factors, confining ourselves to those most clear in the exploratory study, and to increase for each the number of items. On this basis we would (a) first check the factor structure (b) item analyze to obtain the best pool of items (c) to investigate more fully the meaning of integrated and unintegrated components in a way to be explained below. It will be recognized, incidentally, that the most likely cause of low reliability in the initial research was that we were compelled to proceed with the first rough, _a priori_ choice of items, without opportunity to item analyze on experimental evidence.

The choice of factors from Chapter 2, and the attitudes set to represent them, are set out in Table 23.

Table 23

Choice of Factors and Attitudes To Be Represented

In Final Motivation Checking Analysis

Drives	Attitudes
Religion	I want to worship God and obey him.
	I want to pray for God's protection and mercy.
Gregariousness	I want to go to games with my friends.
	I want to spend more time with my friends.
Acquisition	I want to save money in the bank.
	I want nice clothes so people will like the way I look.
Play Phantasy	I want to see more science fiction movies and TV programs.
	I want to have plenty of games, books and other things.
Narcissism	I want to dress well in order to impress the opposite sex.
	I like to see a handsome face and figure in the mirror.
Sensuality	I want to have more holidays in order to rest and take it easy.
	I like to eat well so that I shall grow healthy and strong.
Assertion	I want to read adventure comics.
	I want to seek class office.
Amusement	I want to see western shows on TV.
	I want to see adventure movies.
Adult Aspiration	I want to hold a good job when I am old enough.
	I want to be old enough to have adult privileges.
Self Sentiment	I want to be the type of person everyone likes to have around.
	I want to have a good reputation for ideals and honesty.
Super Ego	I want always to show self control.
	I want to show my father how awesome and admirable I think he is.
Fear	I want to avoid illness and accidents.
	I want to be free from fears of ghosts and frightening adults.

Table 23 Continued

Drive	Attitudes
Protective	I want my younger siblings to behave and mind me. I want to have a pet to take care of.
Constructive	I want to make things and draw pictures related to our school subjects. I want to take things apart to see what makes them work.
Curiosity	I want my pictures to be beautiful and pleasant to look at. I want to read about the world.
Aggression	I want to get even with other kids who have caused me trouble. I want the U.S. to beat its enemies.
Sex	I want to spend more time with my firl friend or boy friend. I want to go to parties where couples are invited.
Patriotism	I want the U.S. to protect small countries from Russia. I want my team to win.

In terms of objective test devices we were compelled to recognize that the attempt to translate Reaction Time Vs. Decision (a good individual test) into a group test situation had failed. We aimed mainly to retain devices which (a) had good loading on the α , β , γ , and ϵ primary motivation strength factor, but which (b) would be given equal and relatively clear representation to the integrated (conscious) and unintegrated (unconscious) second order motivation strength factors.

From careful consideration of motivation strength factor loadings in the Cattell, Radcliffe and Sweney researches, but with most weight on the child samples, we decided on four devices as shown in Table 24.

Table 24

Objective Motivation Measurement Devices Used In Final Motivation Checking Analysis

1. Information (on Implementation of Interests) Integrated
2. Word Association (Paired Words) Integrated
3. Autism (wishful belief, to fit interest goals) Unintegrated
4. Memory for Cues

Ten items were made up for each of these devices for each of the attitudes, thus constituting a total of 80 x 18 = 1,440 items, and requiring a testing time of approximately five hours. The plan was to administer this, in four sections, to a sufficient sample of eighth grade pupils (as most representative of the age range in these studies) and to factor analyze by attitudes, thus permitting definition of the factors as the criteria against which to item analyze the variables. One hundred boys and girls (95 of whom eventually completed all parts, and 89 of whom were used in the analysis) from Monticello, Illinois were taken as subjects.

Analysis Procedures

The data were scored using the a priori item classifications and direction. The raw scores for each attitude on each device were standardized within each subject. This yielded scores which were relative to the subjects own motivation level. It served also to remove the variance related to measurement device itself. Thus, an intelligent subject would have no better scores on the attitudes measured by the information test than would anyone else. This procedure has a tendency to reduce factor loadings slightly since a negative correlation is introduced which is equal to the reciprocal of one less than the number of units being compared.

The standard scores for information and word association were added together to give integrated scores. The Autism and memory standard scores were added to yield unintegrated scores. The score matrices were then intercorrelated yielding a seventy-two by swenty-two intercorrelation matrix which included the thirty-six attitudes measured in both realms.

The factor analysis was computed upon the entire matrix with the extraction of twenty-two centroid factors. The purpose was to discover the factor structure for the entire battery before breaking it down into its integrated and unintegrated parts.

As would be expected a factor structure was found which included both parts, but the off diagonal loadings which represented unhypothesized salients became quite numerous indicating rather approximate locations of the vectors. Table 25 shows the basic structure after the rotation to a position most con onant with the hypothetical structure synthesized from the three previous studies.

Although many of the unexpected loadings have very interesting and probably valid implications, the effort to obtain factor purity makes them unwanted. Further rotation eliminated some of the moderate loadings, but raised some of the unhypothesized variables to even greater importance with a general shift in the factor meaning. Since the major purpose was to locate the purist factor position the resolution to analyze the integrated and unintegrated structures separately was then pursued.

Each of the two matrices wasrotated independent of the other to a position which maximized the hypothesized variables and minimized those assumed to be irrelevant. It will be seen from Tables 26 and 27 that this goal was much more nearly accomplished by this strategy than it had been for the analysis of the two realms together.

Table 25

Refining Research on Total Dynamic Structure

N = 89

Go to church.	Integrated	+43-15+03-05+13-08+16-19+00-10-14+15+12-06+13-06-07+09
	Unintegrated	+31+03-14-00-06+13+12-04-04+10+09+01-02+13+18-04+06-18
Pray to God.	Integrated	+29+13+24-12+03+08+24-24+16-08-10+01+13-05-06+02-01+07
	Unintegrated	+36+22+08+01+09+03-12+06+08+11+29-01-13+12-03-17-03+10
Games in groups.	Integrated	-03+38+14+08-06-11+28+08-11-10+08-21-05+04+03+12-04+22
	Unintegrated	+05+31+08+02+[illegible]+01-14-03+07+05+14-03+15+01-07+08+03+00
Time with my friends.	Integrated	+15+43-01+01 04+20-05-05+20-07-06-05-01-05+07+10+07-14
	Unintegrated	+17+19-09+07+07+05-12+14+02+06+21+02+01-11-18+01+14+21
Save money.	Integrated	+01-01+45+18+06-01-00+02+01+09+05+07-30-03+10+05-03+04
	Unintegrated	+12+20+32+09+01-08-05-01-11-01+34+02+09-05-00-04-07+05
Have nice clothes.	Integrated	-04-02+45-17+40+03+29-16+04-01+07+01+05-01+02+12+12-07
	Unintegrated	+01+03+15-02+07-06+17+10-00-02+19-07-02+04+09+05+10+01
See science fiction.	Integrated	-09+08+08+46+10-08+05-03-01-13+21+04+07-15-08+07-15-07
	Unintegrated	+08+31+07+26-01-02+04+17-05-13+07-21+07-13+14+11+07+01
Have possessions.	Integrated	-03+05-03+49-08+05+24+05+22-05+04+02+01+08+12-01+00-02
	Unintegrated	-01+02+27+21-09+08+07+00-15+11+12+26-03-17-12+11+04-07
Sexy clothing.	Integrated	+11-04+05-15+45-01+13+11+17+03-08-03-10-01+03+16-01-15
	Unintegrated	-14+19+10+01+26+12-04-06+07+09-07+13+03+13-08+22+10+05
Have handsome face and figure.	Integrated	+00+00+20-05+34-10-07+01-07-03+18-10+10+06+18-04+03+22
	Unintegrated	+16+19+11+07+28-09-05+02+10-07+16+09+11+08-19+06-04-15
Have more holidays.	Integrated	+09+28-08-05+03+49+18+04+08-08+10-06+02-11-21-07+24+10
	Unintegrated	+02-01+03+01-16+34+29-00+08+13-13-03+02+21-06+15+07-02
Eat good food.	Integrated	-01+05-01-03+29+38-01+04-01+03-13+01-20+16-12-10-02+08
	Unintegrated	-08+09-05-04-02+19-01+11+04+15+12+02+08+23-06+20+12-03

* The four instrument factors have been omitted in presentation.

Table 25 (Continued)*

Make projects.	Integrated	-03-07-11+02+17+14+26-03-10+08+05+06+05+33+02+13+09+02
	Unintegrated	+06-01-13+01-07+09+15-12-12+17-01+05+21+21+09+05+09+14
Take things apart.	Integrated	-01-07+30-15+02-17-06-01+03+02+07-12-28+45+10+01-23+09
	Unintegrated	+01-01+01+09+01+10-01-06+05-02+11+06+01+40-01-01-10+03
Paint pictures.	Integrated	+11-22+11+01+07-04+04+09-05+03+03+02+07+10+37-07+09+26
	Unintegrated	+02+07+10+04-02-13+11-07+02+02+09+08+06+02+13-02+15+07
Learn about the world.	Integrated	+16+05+05+07-24-09+25-13+01+12-09+16+03-11+32+17-08+02
	Unintegrated	-03-02+07-11+11-13+41+24-07-11+09-11-01-04+46-09+17+05
I fight other kids.	Integrated	-32+17-09+04+16+05+19-01-11-10+01+08-01+10-01+41+21-06
	Unintegrated	-07+14+07+02+27+04-11+12-24+07+02+02+04-13+03+30-16+14
U.S. beat enemies.	Integrated	-04+31+15-02+00-08+07+16-03+13-05-03+07-02+0[illegible][illegible]-11+02
	Unintegrated	+11-02+27+20+05+00-00+01-05+06+15+04+05+08-05+23-10-08
Time with friend.	Integrated	-17-07+12-24+22-04+10+13+08+23-01+06-30-08+16+11+35-05
	Unintegrated	-06+05-06+01+16+09+08+15-15+03+14+10+06-17+11+17+25+01
Go to parties in couples.	Integrated	+09+01-00+04+03+14+09-13+11-06+03-14+01-07+07-08+42+01
	Unintegrated	-07+05-03+05-09+09+05-28-05-04+17-09+04+08+07+07+30+06
U.S. protect small countries.	Integrated	+17+06+06-10-25+02+19+13-06+08+21+17-02+07+11+01-03+38
	Unintegrated	+05+03-02+04+12-04-03-03-07+21+09-06+20-03+13-09+10+21
My team to win.	Integrated	-09+28-11+05+05+06-11+29+04-05+02+10-08+08-16+04+08+39
	Unintegrated	-02+07+16-03-04-07-11+03-19+10+12-06+12+01+05+08+10+29

* The four instrument factors have been omitted in presentation.

Table 25 (Continued)*

	Integrated	+03+02-04+17-10-05+36+07+07+06-09+18-04-04+34+09+03-05
Read adventure comics.	Unintegrated	-10-06+19-06+06+08+32+23+01-16-03+29+25-04+03+27-06-06
Seek class office.	Integrated	+00-06+18+01+02+15+44+06-03+01+08+15-16+10+04-10+06-03
	Unintegrated	-12+00+02+09+02+25+36-03+11+16-09-27-11-05-00+04+18-06
	Integrated	-22+03+06+09+05-02+04+28+18+15-03+18+21-11-01-01-00+11
See T.V. Westerns.	Unintegrated	-03+03-05+13-05+24+11+43+07-09-12-07+03-07+00+13+12+05
See movies.	Integrated	+00+18-03+01+11-04-04+15+03+10+27+09-08-14-06+09+02+05
	Unintegrated	+06+19+15-14+13-02+31+23+06-09-04+06-07-09+16+19+11-06
	Integrated	+20+05-09+02+03-09+01+00+36+07-04+08+12-09-05+11+04+00
Have a job.	Unintegrated	+07+11+07+05+03+33+35-06+25-02-08-03-17+06+03-14+01-21
Grow up.	Integrated	+01+09-03-14+16+16-13+10+32+09+02+08-02-05-13-11+21+05
	Unintegrated	-03-02+11-04+05-02+28+11+53+08-12+02+16+06+05-15-09-10
	Integrated	-04-01-07+12+13-15-13-11+03+31-05+09-16+08+10+19+07-03
Be popular.	Unintegrated	-02-07+20+06-00+09-02+04-09+27+10+17+07+06-14+13-04+02
Have a good reputation.	Integrated	-07-04+03-29-03+15+11+20+03+41+13-03-07-16-09+10+21+04
	Unintegrated	+07+06+00-11-01+01+04-06+13+36+00+07+07+25+06-08-11+10
	Integrated.	-01-02+19-01+06+02+09+10+27-02+31+06-01+05-06-30+09-00
I show self control.	Unintegrated	-07-19+18+03+05+09-04-06-23+07+21+01-08+07+11+01+14-04
Respect father.	Integrated	+12+05+05+10-02-18+13-12-02+13+25+13-03-04-02-10+06+07
	Unintegrated	+15+10+04+06-06-01-01+04-11+03+34-25+04+17+04-12-02+26
	Integrated	+15-20+01+17+11+12+21+10-05-04+04+29+03+12-06+21-21-21
Avoid illness.	Unintegrated	-00-01-01+01+02-05+06+02+03+27+04+15+08-07-17+02-02-06
Beware of ghosts.	Integrated	-15+03+14+11-05+04+14+04+13-05-09+17-00-16+15+00+06+07
	Unintegrated	+08-09+12-06-05-04+13+07+04-03-09+59+07-09+04-09-06+06
	Integrated	+02-09+07-01+05-08-16+03+22-06+19-11+32-02-03+06+12+01
Manage siblings.	Unintegrated	+10+06-06+04+12-18+09-04+13-03-03+15+30+09+13-07-02+09
I care for pet.	Integrated	+11-09+02+01-02+34+34+15+12+08-17+13+19+00+13+02-07-08
	Unintegrated	+01+26+08+02+07-02+04-04+04+09+11+07+15+12-14+09-06+12

* The four instrument factors have been omitted in presentation.

Table 26

Rotation of Integrated Dynamic Structures
N = 89 .

Go to church.	$\boxed{+42}$	-09	+04	+01	+07	+05	-10	-17	+16	-26	+05	+00	-07	-14	+08	-08	+05	+0
Pray to God.	$\boxed{+40}$	-01	+09	+04	+11	-02	-01	-06	+23	-19	-06	-07	-03	-02	-03	-00	+08	+1
Games in groups.	+22	$\boxed{+31}$	-18	+19	+02	-03	+19	+15	-22	+07	-02	-01	-05	+18	-08	+14	+14	+0
Time with my friends.	-28	$\boxed{+31}$	-06	-05	+18	+20	-20	-05	+20	-13	+04	+05	+07	-09	+12	+14	+06	-0
Save money.	+02	-05	$\boxed{+42}$	+16	-01	-01	-07	-04	-05	+23	-08	+10	+03	+02	+02	+02	+02	+0
Have nice clothes.	+30	+08	$\boxed{+31}$	-12	+20	+01	+12	-02	-10	-06	+15	-13	+11	-07	-05	+25	+11	-0
See science fiction.	+09	+12	+00	$\boxed{+29}$	+08	-01	-01	+25	-09	+10	+06	-03	-02	-09	-07	-03	-20	+0
Have possessions.	-02	+03	-06	$\boxed{+37}$	-01	+03	+09	-01	+01	+01	+02	+02	+20	+10	-03	-00	+01	+1
Sexy Clothing.	+10	+02	+16	+08	$\boxed{+37}$	+10	+17	+01	+27	-15	-07	-06	+02	+03	-11	+03	+05	-2
Have handsome face and figure.	-05	+11	+13	-03	$\boxed{+36}$	+03	-20	+07	-02	-07	+11	-01	+05	+09	+12	+03	-09	+0
Have more holidays.	+06	+10	-15	-01	+08	$\boxed{+46}$	+06	+02	+09	+04	+01	-08	+07	-19	-00	-04	+05	+1
Eat good food.	+02	-09	+05	+10	+10	$\boxed{+44}$	+10	-05	+03	+13	-10	-02	-05	-01	+01	-13	+05	-0
Read adventure comics.	-05	-00	-10	+06	-05	+05	$\boxed{+30}$	+12	-07	-01	+05	+00	+00	+05	+32	+23	+04	-0
Seek class office.	+04	+05	+10	+04	-02	-03	$\boxed{+32}$	-01	+05	-00	+09	+32	-08	+13	+00	-02	+14	+0
See T.V. Westerns.	-02	-05	+10	-08	-03	-05	+38	$\boxed{+51}$	+05	+03	+03	+01	+17	-01	-06	+12	-19	+1
See movies.	-16	+19	-02	+04	+03	+06	-08	$\boxed{+27}$	+21	+13	+12	+04	-15	+03	+10	+02	-07	+0
Have a job.	+08	+04	+02	+00	-07	-07	+03	+05	$\boxed{+56}$	-21	-00	-06	+01	+14	-16	+14	+01	+2
Grow up.	-13	-08	+03	-04	+17	+04	-00	+18	$\boxed{+48}$	-07	-00	+10	+02	+07	+02	-15	+20	+1
Be popular,	-14	-12	+12	+05	-05	+02	-07	-02	-02	$\boxed{+27}$	+02	-16	-13	+09	+08	+20	+08	+0
Have a good reputation.	-14	+04	+20	-06	-15	+15	+08	+03	+13	$\boxed{+26}$	-02	+08	+03	+00	-10	-04	-02	+0
I show self control.	+04	+08	+03	-15	-04	+04	+16	+19	+09	-06	$\boxed{+41}$	-00	+18	+07	-06	-11	+10	-0
Respect father.	+01	-02	+07	+02	+11	-18	-08	+02	-08	+13	$\boxed{+28}$	+04	-13	+02	-06	+03	+01	+19
Avoid illness.	-01	+05	+15	+05	-10	-02	+07	+04	+19	-03	-04	$\boxed{+30}$	+01	+02	+04	+08	-22	-0
Beware of ghosts.	+05	-08	+01	+15	-05	-03	+11	+14	+12	-06	-08	$\boxed{+05}$	-00	-02	+23	+01	+09	+0
Manage siblings.	+01	+10	+01	-06	+05	-13	-36	+01	+04	-13	+15	-03	$\boxed{+47}$	+02	-01	-01	+10	+1
I care for pet.	-09	+01	+15	+04	+04	+24	+11	-11	+04	-11	-07	+21	$\boxed{+33}$	-11	+04	-02	-25	+0
Make projects.	-09	+02	-08	+04	+07	+01	+03	-07	-10	+08	+06	+14	+06	$\boxed{+25}$	+13	+15	+16	+13
Take things apart.	-07	-06	+17	+06	-00	-20	-03	-08	+14	+01	-10	-04	-13	$\boxed{+54}$	+11	+03	-01	-06
Paint pictures.	-03	-11	+03	-11	+07	+08	+03	+15	+02	-03	-03	+07	+09	+21	$\boxed{+45}$	+08	+01	+01
Learn about the world.	-04	+02	-02	+17	-13	-05	-20	-12	-06	+03	-00	+05	-03	+02	$\boxed{+41}$	+08	-00	+0
I fight other kids.	-03	+13	-14	+04	+01	-10	+13	+01	-06	+01	-07	-10	-08	+03	+02	$\boxed{+54}$	+17	+22
U.S. beat enemies.	-11	+39	+09	+14	-06	-12	-18	+08	-05	+11	-16	+11	+15	+10	+05	$\boxed{+34}$	-02	+07
Time with friend.	-06	-03	+20	-11	+00	+04	+20	-08	+08	+08	+06	-04	-03	-01	+01	+22	$\boxed{+35}$	-07
Go to parties in couples.	+09	+06	-12	-06	+02	+13	+02	-07	+11	-06	+05	+05	+09	+00	+09	-00	$\boxed{+46}$	+02
U.S. protect small countries.	-03	-09	-03	+10	-08	-04	-24	-05	+01	+10	+03	+03	+02	+16	+31	+06	-12	$\boxed{+37}$
My team to win.	+06	+04	-15	+13	-07	+04	+04	+20	+19	+05	-10	+01	-05	+08	-09	+09	+15	$\boxed{+39}$

Table 27

Rotation of Unintegrated Dynamic Structures
N = 89

Go to church.	+38+03-07+03-10+01+06+04-02+03+18+03+13+01-03+10+00-0
Pray to God.	+33+03+05-19+16+02-05-03+03+09+07-02+02-04-03+11-03+0
Games in groups.	+02+19+09+05+05-03-05+11+07-00-02-12+00-05+03+07+03+0
Time with my friends.	+08+21+03+05+08+07+02+06+04+06-05-02+18-07-10+03+10+0
Save money.	+04+05+35+03-07-03+05+01-08-01+02-03+06-07+10+09-06+0
Have nice clothes.	+04+05+08+08+05+09-02+05+05-00+08-16+07-09+18+10-05-0
See science fiction.	-04+09+08+34-03+01+17+09+01-01-03-35+13-05+10+02-11+0
Have possessions.	-12-04+36+19-03-05-09+07-04+17+10+14-01-07+04+07+10-0
Sexy clothing.	-06+05-10-04+26-03-10+06+14+15-10-03-15+11+02+12+08+1
Have handsome face and figure.	+04+02+06-04+40+09-06+07-04-06+03-09+17-11+05+01-22-0
Have more holidays.	+05-04-03+01-01+26+02+15+05-03+14-06-03-02+06+09-07+0
Eat good food.	-02-01-01-01+05+26-10+10-00+07-05+04-16+08+03+01+06-0
Read adventure comics.	+05+05+00+06-09+10+51+08+01-07-15+28+17-01+06+17-09+0
Seek class office.	+08+03+03+02+04-04+04+14+16+04+11-23-10+04+15+03+06-0
See T.V. Westerns.	-06+04-00+16+07+10+07+39+10-15+06-06+03-01+05-01-06+0
See movies.	+08+06+08-04+16+06+18+28-01-12-08-03+03-06+20+09+02-0
Have a job.	+32-09-06-03+05-07+17-01+31+15+02-06-03+01-03+09+02+0
Grow up.	+06+07-02-02+06+01+07+07+52-02+05+04-01-06+07+08-10+0
Be popular.	-03-04+12+07+01+09-07-07-02+20+21+09-07-07-00+11-12+0
Have a good reputation.	+11-06-00-07+00+02-06-13+22+16+08+04-09+16-01+04-06+1
Show self control.	+11-05-03+02-05-06-04-01+03+14+21+04-10+01-06+14-07+1
Respect father.	+14+10+09-03-13+05+08-03-06-09+08-17+15+10+14+04-10+0
Avoid illness.	-07+09+12+03+06+02+11-02+00+11+10+17+06+08+02-15-09-1
Beware of ghosts.	-01-06+14-05+04-07+02-01+02+11-04+55+14-03+10+03+14+0
Manage siblings.	+02+05-02+05+12-08-00+01+15-06-04+07+29+09+16+02-04+0
Care for pet.	-06+07+08+09+06+11+07-13+05+11-09-10+12+05+08+01-06+0
Make projects.	+04+01-05+03-02+10+07+01-07+01+07+07+17+21+13-04-06+1
Take things apart.	+07-07-12-05+04-02-06-01+17-00-02+07+02+33-01+08-01-0
Paint pictures.	-09+12+09+03+04+00-04+11+06-01+01+08+09+06+20-01+06+0
Learn about the world.	+16-09+07+02+10-02+13+03-03-02+05-13+12-02+46-01-09+0
Fight other kids.	-01+08-04+11+16-09+06+11-07+08-03-15-01+02-04+12-02+1
U.S. beat enemies.	+08+01+08+00+01-01+05+05-05-02+08+01-02-00-02+28-07-1
Time with friend.	+11+05+03+17+01-06+05+07+00+16-07+03+07-03+03+10+19+01
Go to parties in couples.	-01+15+02-04-13+07-15+09-03-02-12+01-03+04+12+10+35-02
U.S. protect small countries.	+11+03+00+06+05-08+00-07+10+12+10-09+10+02+04+04-09+22
My team to win.	-14+12+09+00-04+12+07+09-10-05+05-05-01+01+05+00-15+27

The matrices exhibited excellent simple structures with the salients for each factor except for rare exceptions being only those hypothesized. These clearly defined factor positions made it possible to study the factor relationships more closely. Table 28 shows the direction cosines between vectors in the integrated realm above the diagonals and in the unintegrated realm below. The diagonal entries represent the angular deviation of the integrated vector from the unintegrated vector for each of the drive values.

The interpretation of vector correlations is difficult since conceptually the position of the vector is dependent upon all other vectors. The location of the factors was therefore necessary. After this was done, Table 29 was constructed to show the factor intercorrelations in both realms. Whereas these values are generally negatively correlated with the reference vector correlations, this is not always true and can yield very erroneous results, the degree of correspondence or divergence for each drive measured in the two realms.

Some study is now under way to determine by comparison to criteria conditions, whether this diagonal value doesn't reflect the psychological processes of repression or denial. If these hypotheses can be demonstrated then the instrument will have value in measuring more obscure and dynamically more complicated processes than has been possible with any instrument now available in psychology.

The possibility of intra-subject conflict is implied in some of the results obtained and can be speculated upon as being indicative of an area for future research. The drives exhibiting the greatest negative correlation were religion, play fantasy, construction, sex and patriotism. If our assumptions are valid these would be the areas in which psychologists and teachers would expect to find conflict or tension in children of this age.

Table 28

Reference Vector Correlations for Integrated and Unintegrated Drives*

Children's Study - Monticello - N = 89

Integrated Drives

Religion	-09	-26	-20	-10	-25	+34	-28	+18	-23	+41	+21	-44	+14	+26	-28	+42	-28	-01
Gregariousness	-11	+26	-03	-25	+08	-18	+25	-01	+42	-17	+21	+21	-02	-24	-02	-18	+04	-19
Acquisition	-14	-54	+10	-19	-21	-22	-11	-05	+06	-24	-02	+18	+18	-25	-30	+27	-31	+24
Play Phantasy	-02	-04	+02	+27	+23	-04	-23	-24	+04	+08	-43	-12	+12	+20	-17	-33	+41	-12
Narcissism	-06	-04	-19	-07	+13	-34	+36	-24	-11	-27	-19	+01	+06	-25	+15	-31	+24	+17
Sensuality	+09	-35	+15	+03	-05	-22	-26	+17	-25	+33	+25	-39	-01	+42	+01	+12	-33	-23
Assertion	+21	+25	-12	-14	+21	-13	-18	-13	+08	-38	-02	+10	-21	-26	+16	-31	+10	+05
Amusement	-25	+15	+32	-48	-26	-23	-27	-18	-06	+31	+10	+06	-38	+13	-14	+06	-28	-34
Adult Aspiration	+22	-24	+27	+11	-01	+04	-11	+01	+08	-29	-17	+12	-07	+07	-07	-14	+07	-14
Self Sentiment	-49	+01	-06	+15	+15	-22	-06	+03	-32	+49	+04	-37	-04	+30	-12	+02	-16	-40
Super Ego	-29	+48	-21	-12	+33	-49	+28	+13	-09	+20	+15	-33	+21	+05	-09	+21	-49	-08
Security	+07	+51	-51	-20	-12	-20	+08	+04	-15	+04	+27	+03	-07	-26	+04	-19	+33	+05
Protection	+04	-09	+35	-40	-30	+02	+21	+38	-12	-18	-35	-06	+17	-10	-22	+25	-09	+32
Construction	-17	-11	+32	-07	-01	-42	-06	+47	+08	+16	+21	-09	+12	+29	-12	+11	-33	-41
Curiousity	+00	+23	-60	+39	+27	+02	-18	-50	-32	+07	+14	+20	-55	-25	-11	-28	+22	-03
Pugnacity	+43	-30	-34	+13	-14	+15	-07	-50	-06	-13	-53	+01	-18	-47	+25	+18	-38	+17
Sex	+13	-18	+12	+14	-24	+41	-12	-32	+36	-34	-38	-03	-04	-36	-01	+18	+27	+06
Patriotism	+24	-14	+09	-31	-03	+34	-04	+11	+38	-58	-19	-07	+15	-26	-25	-01	+09	+13

Unintegrated Drives

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* Intercorrelations for integrated drives appear above the diagonal and for unintegrated drives below. The diagonal entries are the correlations of the two measurements of each drive.

Table 29

Factor Correlations for Integrated and Unintegrated Drives*
Children's Study - Monticello - N = 89

Integrated Drives

Religion	-24	-43	-10	+12	+13	+25	+10	-08	-03	+13	-05	-10	-14	-02	+14	-05	+25	+15
Gregariousness		+26	-43	-08	+59	-52	+49	-67	-18	-01	-69	-54	-61	-16	+57	-39	+21	+36
Acquisition			+05	+02	-55	+58	-09	+57	-28	-57	+66	+15	+28	-05	-38	+62	-08	-76
Play Phantasy				-15	+04	-14	-03	-15	+15	+25	-10	+02	-14	-14	+05	-16	+10	+11
Narcissism					+05	-20	+61	-69	-28	+04	-65	-66	-68	-33	+76	-40	+58	+66
Sensuality						+03	+14	+57	-46	-56	-60	-11	+17	-18	-06	+52	+27	-33
Assertion							+20	-34	-73	-51	-29	-80	-70	-42	+86	+06	+64	+15
Amusement								+33	-09	-37	+89	+49	+66	+27	-53	+64	-30	-58
Adult Aspiration									+21	+81	-15	+63	+37	+32	-57	-44	-45	+14
Self Sentiment										+42	-45	+39	+14	+13	-24	-69	-22	+46
Super Ego											+23	+46	+64	+19	-52	+66	-27	-61
Security												+10	+75	+46	-80	+10	-64	-24
Protection													+10	+44	-74	-22	-58	-30
Construction														-27	-48	+09	-50	+02
Curiosity															-14	-17	+59	+41
Pugnacity																+44	-14	-55
Sex																	-21	+35
Patriotism																		-22

Unintegrated
Vector Matrix
ill-conditioned, and
not invertable by
normal means

Unintegrated Drives

Table 30

Predictions of School Achievement Obtained From Ability, Personality and Motivation Traits in Various Combinations

A. Standard Achievement (English, Arithmetic) Test For All Classes

(a) Directly From Raw Scores Total Sample (Urban and Rural Together)		(b) From Pure Factor Correlations Total Sample (Urban and Rural Together)	
I. Abilities:		I. Abilities:	
1. Fluid General Ability (Cattell Culture Fair)	.46	1. Fluid General Ability (Cattell Culture Fair)	.36
2. General Ability plus Specific Ability Investments (Cattell Culture Fair and Thurstone Primary Mental Abilities)	.68	2. General Ability plus Specific Ability Investments (Cattell Culture Fair and Thurstone Primary Mental Abilities)	.64
II. Personality Traits: Fourteen factors of the High School Personality Questionnaire	.55	II. Personality Traits: Fourteen Factors of the High School Personality Questionnaire	.60
III. Motivation Traits: Reliabilities at present judged too low for meaningful computational results		III. Motivation Traits: Fourteen ergs and sentiments as in School Motivation Test in Table 22	.57
IV. Combined Abilities, Personality and Motivation Traits	.72	IV. Combined Abilities, Personality and Motivation Traits	.78
		V. Personality and Ability Traits only	.75

B. Achievement Combining Teacher Ratings On Classroom Performance In All Areas

Directly from Raw Scores Separately for Rural and Urban Samples:

Rural (Paxton)		Urban (Springfield)	
Abilities (CF and PMA)	.67	Abilities (CF and PMA)	.71
Personality Factors	.61	Personality Factors	.69
Combined Abilities and Personality Factors	.74	Combined Abilities and Personality Factors	.79

On pure factors no analysis was made separately for rural and urban.

Chapter 6

DISCUSSION AND SUMMARY

Since the main interest of this research has been to evaluate the increment in prediction possible through regard for personality and motivational influences, let us begin by considering the multiple correlations from the various sources. A novelty of our procedure has been to obtain correlations with the criterion not only (a) in the usual way from raw scores and resultant factor score estimates, but also (b) from pure factor scores, obtainable by pursuing simple structure rotation of a factor analysis to the highest attainable degree of accuracy.

As this accuracy is never complete, some error inevitably remains in the latter, but it is no longer the systematic error of the kind one attempts to handle in raw scores by the correction for attenuation. The powerful reason for this new approach in the present exploratory research is that motivation factors can at present be only quite poorly estimated from available raw scores, and that what we most need isnot, at this juncture, high accuracy of determination of particular motivation factor criterion correlations, but a best possible estimate of what total prediction of achievement can be reached from these kinds of measurement when their reliabilities are eventually raised to the usual 0.9 (approximate) levels.

Table 30 sets out the multiple correlations obtained (a) separately for the raw score and the pure factor approaches, (b) for abilities, personality factor and motivation traits, singly and in combination, (c) for total and partial (urban, rural) samples.

It is at first rather surprising, statistically, that the comparison of the upper right (pure factor) and upper left (factor estimates from raw

Table 30 Continued

It should be noted that the criterion in A is also a criterion factor, for in rotation it so proved itself. Consequently, the relations in A is from both criterion and predictors treated as perfectly reliable, though subject to error in validity, in terms of circumstantial validity (Cattell, 1959).

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scores) values is not more in favor of the former. It is in favor of the pure factor personality measures, and would unquestionably be so for the motivation measures, but, in the ability realm, we can only suppose that the reliabilities and validites now reached have become so good that, with the capitalizing on sampling error which occurs in a multiple correlation, they become in general level indistinguishable from the pure factor results. Also, we must bear in mind that although the pure factor solution gains through perfect reliability of measurement it loses through error of correlation with the criterion, due to rotation uncertainties. This latter would adequately account for the pure factor general ability criterion correlation of 0.36 being below the actual observed battery correlation of 0.46.

Naturally, not all the comparisons one could wish can be made with limited clerical resources, and, in this case, the comparison of the separate samples with the combined sample cannot be entirely independently made because we wished also to find out what the result would be of adding local school teachers' evaluations of achievement (class performance) to the standard "external examination" achievement test. (The latter, as used in the upper part of Table 30, is the Stanford Achievement Test, as set out in Table 6 above and consisting of a combination of five part scores covering

English and Arithmetic.) However, apart from some slight influence from greater homogeneity in the urban and rural samples when considered separately, and some possible inter-group variance, there should be no systematic reason for the two parts to run higher in their relations than the whole, unless it were due to difference in the mode of estimating achievement. They *do* run higher, insignificantly in the rural, but significantly in the urban, so we must conclude that this is due to the meaning of "achievement" being changed from *English plus Arithmetic* in the Stanford to the more *global and intimate* evaluation of achievement resulting when the local classroom evaluations are introduced.

With this comment on the sub-sample picture let us turn to the main part of the table. The first generalization herefrom is that *the contributions to prediction from abilities, personality traits and motivational states are essentially of the same order*, i.e., they are about equally important. If the conclusions on the real nature of abilities which follow are correct it could even be said that the new predictors, personality and motivation, are more important than the traditional ability predictors.

Secondly, *the three areas of predictor measurement (especially if drop some interest variance in the PMA scores) are largely independent*. This statement raises complex statistical questions which can only be treated adequately in the space of the book by Cattell and Butcher mentioned in the Preface. Here we shall simply state that except for about a one-third overlap of these measures, due to psychological reasons discussed by Cattell in *Personality and Motivation Structure and Measurement*, 1957, the three sets of concepts deal with essentially distinct aspects of the total individual which contribute not only about equally but predominantly independently to the criterion. This can be seen in that if we take, from the right of Table 30 a value of about .55 for the direct separate correlations of intelligence, etc., with achievement and assume them to be *completely* independent predictors we obtain $(.55^{2}) \times 3 = .91$ percent of the variance accounted for, whereas if we take .8 as the combined prediction we account for 64 percent. (This is what we have expressed above verbally as a "one-third overlap".) From a practical point of view, even if one accepts the combined ability value of .64 (keeping to the pure factor calculations in Table 23), the gain from adding personality and motivation measures to the prediction is one of 50% $(100(.78^{2} - .64^{2}) \div 64^{2})$.

But it is possible that the combined ability value of 0.64 or 0.68 is an overstatement, and this statement at any rate must bring us to consider the meaning of the discrepancy between, say, the 0.46 obtained for the Culture Fair and Primary Mental Abilities Batteries together. Elsewhere (1957) Cattell has made a serious attack on the common educational and psychometric assumption that there exists a single general ability factor behind the PMA and other traditional intelligence tests, and has put forward the theory of fluid and crystallized general ability according to which there are *two* general factors. More recently this has been factor analytically demonstrated, and it has been shown that the Culture Fair test consists largely of the fluid general ability factor whereas traditional verbal, etc., intelligence tests contain both factors. According to this theory the crystallized general ability factor is a function of the past investment of fluid general ability in educational skills. It is, indeed, indistinguishable by any presently known argument or test from "school achievement" itself. An interesting check on this exists in the present research, where the predictive value of the PMA on the Stanford Achievement (English plus Arithmetic) is found to reside (Table 15) largely in the verbal and numerical primary abilities. Moreover these are the primaries most heavily loaded in the crystallized general ability factor. If crystallized general ability is really nothing but achievement skills acquired through fluid ability the traditional intelligence test, to put it bluntly, is predicting achievement from achievement.

If the object of psychology as a science is to be analytical, and to understand, in this case, achievement, in terms of real psychological influences of known natural history, it is important that we separate from achievement that which is due to real intelligence (fluid general ability) and that which is just the momentum, or even the mere replication, of a particular level of achievement.

A survey of the literature suggests that, in general, the better the intelligence test as a true general ability measure, the nearer the achievement prediction is to 0.5 (as in Sir Godfrey Thompson's Scottish Survey) and the further from 0.6. By extrapolation one might expect that a Culture Fair test would not yield a value higher than 0.5, which, with correction for attenuation, would be what our 0.46 value amounts to. If this is the case, the best conclusion from our data is that as personality and motivation measurements come of age, in terms of factor validity and reliability, they will already, in junior high school, contribute more than the general ability measurement to the prediction of achievement.

The multiple correlations of all three kinds of personality traits with achievement are 0.72 and 0.78 in our main sample. In the sub-samples, where motivation was left out, the ability-personality R's equal .74 and .79, from which, by comparison (Table 30(b), bottom) we might estimate about 0.82 for the mean urban-rural correlation with all three. In short, a value of about 0.80 is the central tendency for the multiple correlation we may expect at present in predicting general school achievement from a combination of intelligence, personality and motivation factor measurements. It is interesting to speculate how much further this might be raised by attention to improvements in test reliability and validity for the existing 14 personality factors and 14 motivation factors. Complex considerations would lead us to conclude that it is unlikely that it will be raised by more than 0.05 in the next decade or by 0.10 ever. For example, there is reason to believe that we have already harvested the majority of the major broad personality and motivation factors, and the pure factor method leaves relatively small room for validity improvement as the actual batteries are made more reliable and valid (as we hope to make them in the next decade).

Perhaps, therefore, a theoretical value of 0.86 to 0.89 is to be envisaged as the limit of such prediction. This would mean (using 0.87^2) that 76% of the variance in school achievement, among children in essentially similar school systems, is due to properties of the child himself. It leaves only 24% for situational advantages in the home not directly affecting the child's personality (e.g., a quiet room to work in), for differences of class and teacher, and for accidents of physical illness, family moves, etc., etc. One cannot help being a little astonished at the closeness of approach of the applied psychology of basic personality and motivation research toward what must be the theoretical limit of efficiency of prediction from this domain of observation! In this connection it is interesting that the prediction values run consistently higher, as noted above, for the urban than for the rural sample (Table 30,B). Is it possible that "accidents" in the broader sense are less influential in the more humanly controlled, protected and uniformed urban environment, so that success depends somewhat more directly on the child's own qualities. At any rate, as civilization moves more toward a provision of opportunities fitten to talents we may expect a rise rather than a fall in these coefficients.

Finally, although our main concern has been achievement in the realm of scholarship, we took a side glance, with scant and less reliable criteria, at achievement in some broader sense, by having teachers rate advance in (1) General social and emotional adjustment, and (b) Moral soundness of behavior of the child (obverse of delinquent and anti-social behavior). The results are shown in Table 31, with the results for scholastic achievement (narrower, external examination) repeated for comparison.

Table 31

Multiple Correlations of Personality Factor and Ability Measures With Broader Criteria of Achievement

Predictors	Scholastic Achievement (Stanford)		Socio-Emotional Adjustment		Moral Behavior Level	
	Urban	Rural	Urban	Rural	Urban	Rural
13 High School Personality Questionnaire Factors (With B, Verbal Ability removed)	.41	.38	.51	.45	.42	.41
Culture Fair plus Primary Mental Abilities	.71	.67	.45	.47	.23	.25

(Uncorrected for attenuation on test or criterion)

It is evident that when one considers the aims of the school in the broader sense the ability measures fall in importance and the personality factors rise. Indeed, one might question whether "adjustment" ratings by teachers in the classroom are not so clouded by halo from scholastic achievement that spurious correlations with abilities would be expected. However, such exhaustive surveys as that of Chassell leave little doubt that some positive correlation of intelligence with adjustment objectively evaluated does exist, though with more resources for refined analyses we believe the values would ultimately change in the direction of lower values than those here indicated, while personality and motivation values might become substantially higher.

The following summary leaves most actual substantiating figures back in the tables, since this report itself is too brief to justify an extensive summary.

(1) Objective (non-self-evaluative) motivation measures previously used largely with adults show validity also for children and yield a very stable structure of dynamic factors, which prove to be largely ergs and sentiments conceptually continuous with those found in adults.

(2) Although the dynamic structure with children is stable and replicable we were not yet able to develop batteries approaching the reliability of ability and personality measures. So the fourteen most measureable of over twenty dynamic structures were taken and their correlations with the achievement criterion determined as pure factors by simple structure rotations.

(3) Two samples, urban and rural, each of boys and girls, were taken, three kinds of achievement criterion (a) a standard achievement test external to the school system, confined to English and arithmetic, (b) a composite class teacher evaluation based on class grades in all areas, and, (c) a teacher evaluation of achievement in non-scholastic areas of personal socio-emotional maturation and moral soundness of behavior.

(4) Some significant urban-rural, boy-girl differences were found on the basic measures involved, including the High School Personality Factor Questionnaire, the Thurstone Primary Mental Abilities, the Culture Fair Intelligence Test, and the 14 motivation factor test here partly developed. For example, girls are higher on personality factors of sensitivity, conscientiousness and control, boys on dominance and self sufficiency; urban are higher on numerical ability and on narcism in the ergic tensions (motivation).

(5) By direct correlations of ability, personality and motivation batteries, and by factoring a 110 variable matrix and notating 36 factors to simple structure, two distinct evaluations were made of correlations among predictors and of correlations between predictors and criteria.

(6) The main conclusion, common to both methods and both samples, is that abilities, personality traits and motivational traits contribute about equally (r's of about 0.5 - 0.6) to the variance of the scholastic achievement criterion, and mutual overlap in variance to only about one-third. Their combined multiple correlation with the criterion varies through .72, .78, and .79 (.79+, because motivation was omitted in this case) in different samples.

(7) With school progress in the wider sense of emotional learning and socialized behavior the correlations are substantially higher for personality than ability factors.

(8) The psychological nature of the predictors found relevant and irrelevant agrees with what would be expected from current personality and motivation concepts and introduces new insights into causes of progress and backwardness.

(9) It is argued that most traditional intelligence tests contaminate a "fluid" general ability factor with a "crystallized" general ability factor,

which is itself largely achievement, whence predictions by such tests are partly predictions of achievement by achievement. For analytical, scientific purposes a better understanding of influences in achievement would be obtained by entering with culture fair "fluid" general ability measures, along with comprehensive measures of personality and motivation factors.

(10) The chief research needs in this area at present are: (a) a check on the importance revealed by this exploratory study for personality and motivation, using the same personality factors on different samples. (b) A testing of specific hypotheses here emerging in relation to the mode of action producing certain personality and motivation correlations, and, (c) an extension to the college undergraduate level, where one might suppose that the relative restriction of the ability range would cause the personality and motivation factors actually to outweigh ability factors in determining achievement.

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Appendix I

Specimens of tests used in study:

- HSPQ
- Student Rating Scale
- Student Interest Quiz
- Student Compatibility Poll
- Objective Attitude Tests
  1. Information
  2. Word Association
  3. How Much and How Many
  4. Memory

IPAT

FORM A

H. S. P. Q.

WHAT TO DO: You have a booklet and an answer sheet. Write your name, age, etc., on the answer sheet where it tells you to.

We want to know what sort of a person you are. The paper before you has a lot of questions about your interests and your likes and dislikes. When you are told to start, you should begin with the first question. Read it carefully and answer it as truthfully as you can. Do the same with all the other questions. (No one else will see your answers.)

Read the following example and see which one of the two answers suits you better:

EXAMPLE 1. Would you rather:

a. visit a zoo? b. go up in an airplane?

Now mark your answer at the top of your answer sheet where it says "Example 1." Put an × in the left-hand box if your answer choice is the "a" answer or in the right-hand box if you choose the "b" answer.

Sometimes it will be hard to make up your mind between the two, but you can always find one answer that suits you a *little* better than the other. So never leave a question without marking *one* of the answers. (You are to mark the answer you choose on the separate answer sheet unless your teacher tells you differently.)

Now try this example:

EXAMPLE 2. If you have a quarrel, do you make friends again quickly?

a. Yes b. No

Nearly always you will find only two answers, but even if there are more, you must always mark only *one.* You do not have to write any words.

As you see from these examples, there are usually no right and wrong answers. Each person is different and has only to say what is true for *him,* or which he thinks is the better answer.

Do not spend a long time making up your mind. Mark the choice you first think of and go right on to the next questions.

If there is anything you want to ask about what you have to do, ask now. If there is nothing now, but you meet a word later on you cannot read, stop and ask then.

It will take about three-quarters of an hour to do the seven pages, but you may have a bit more time if you need it. BE SURE TO ANSWER EVERY QUESTION.

DO NOT TURN PAGE UNTIL TOLD TO DO SO

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1. Have you understood the instructions?
   a. Yes **b. No**

2. At a picnic, would you rather spend some time:
   a. exploring the woods alone? **b. playing around the campfire with the crowd?**

3. When you are asked to write an essay about your private thoughts and emotions, do you:
   a. enjoy expressing yourself? **b. prefer to keep your feelings to yourself?**

4. Do you often make big plans and get excited about them, only to find they just won't work out?
   a. Yes **b. No**

5. Do you find it easy to keep a secret?
   a. Yes **b. No**

6. In school would you rather be:
   a. librarian, looking after the reading books? **b. games coach?**

7. When things go wrong, and upset you, do you believe in:
   a. just smiling? **b. making a fuss?**

8. If friends' ideas differ from yours, do you:
   a. want to know all about their ideas? **b. try to show them how your ideas make better sense?**

9. Do you sometimes feel you've got to *count* things, though your friends say it's silly?
   a. Yes **b. No**

10. Do most people seem to enjoy your company?
    a. Yes, a lot **b. Just average**

11. Which of these says better what you are like?
    a. A dependable leader **b. Charming, good-looking**

12. Do you sometimes feel, before an exciting party or outing, that you are not so interested in going?
    a. Yes **b. No**

13. Do you enjoy dangerous and exciting things, like going on a roller coaster, as much as your friends seem to?
    a. Yes **b. No**

14. Do you find it easy to make a friendly approach to the captain of the team or some important boy or girl in school?
    a. Yes **b. No**

15. Do you usually:
    a. follow your own idea of what is best? **b. do the same as other people?**

16. When classmates play a joke on you do you usually enjoy it, without feeling at all upset?
    a. Yes **b. No**

17. Do you think there is a fair chance that you will be a well-known, popular figure when you grow up?
    a. Yes **b. No**

18. Do you set yourself a definite goal of just what level of school grade you aim to get?
    a. Yes **b. No**

19. Would you rather be:
    a. a travelling TV actor? **b. a medical doctor?**

20. Do you think that life has been a bit happier and more satisfying for you than for many people?
    a. Yes **b. No**

21. Do your parents often complain about your untidiness?
    a. Yes **b. No**

(End, column 1 on answer sheet.)

22. In putting on a play would you rather act the part of:
a. a salesman? b. a lone prospector for uranium?

23. Mend means the same as:
a. repair b. help c. patch

24. Truth is the opposite of:
a. fancy b. falsehood c. denial

25. Would you rather spend a free afternoon:
a. watching dangerous speed boat racing? b. walking by a lake with a friend?

26. When chalk screeches on the blackboard, does it make you feel queer?
a. Yes b. No

27. When you are reading something that is hard to follow, do you:
a. start to think of other things? b. stay reading but nearly fall asleep?

28. When you finish school, would you like to:
a. do something that will make people fond of you, though you are poor? b. make a lot of money?

29. If you had a job in a theater, would you rather be:
a. the person in charge of scenery and lights? b. an actor, even of small parts?

30. With people you know, can you usually talk them into joining you in things?
a. Yes b. No

31. Do you get pleasure in seeing that people follow approved rules and regulations?
a. Yes b. No

32. Are you always ready to show, in open competition, that you can do most things as well as other people?
a. Yes b. No

33. In a stage play would you rather act the part of:
a. a kindly and famous teacher? b. a bold pirate (or pirate's lady)?

34. Do you feel that you could, right now, with a few weeks' training, pilot a small plane?
a. Yes b. No

35. When you are older, would you rather be:
a. managing an act in a circus? b. copying house designs in an architect's office?

36. Do you sometimes feel you are not much good, and that you never do anything worthwhile?
a. Yes b. No

37. Would you rather read a book about:
a. the love story of a famous admiral? b. inventions that have improved our homes?

38. Would you rather be dressed:
a. to suit yourself, even if unfashionably? b. fashionably, getting general admiration?

39. Do people say that you are a person who can always be counted on to do things exactly and methodically (carefully)?
a. Yes b. No

40. If a friend while swimming were fastened upon by a leech (a sort of water worm), could you calmly bite it, if that were the only way to make it let go?
a. Yes b. No

41. Do you sometimes get all tense and excited when you think back over things that happened during the day?
a. Yes b. No

(End. column 2 on answer sheet.)

42. Do you feel hurt if people borrow your things without asking you?
a. Yes **b. No**

43. Firm is the opposite of:
a. hard **b. kind** **c. loose**

44. "Rich" is to "money" as "sad" is to:
a. trouble **b. friends** **c. land**

45. Do you make the effort to go and speak to a new teacher or pupil at school and to introduce them?
a. Yes **b. No**

46. If your friends leave you out of something they are doing, do you:
a. think they made a mistake? **b. feel hurt and angry?**

47. Do people say you are sometimes careless and untidy, though they think you are a fine person?
a. Yes **b. No**

48. Have you ever told your parents you consider some teachers too old-fashioned to understand modern young people like you and your friends?
a. Yes **b. No**

49. Would you rather spend an evening:
a. at a gay party? **b. with the hobby you like most?**

50. In a group of people, are you generally one of those who tells jokes and amusing stories?
a. Yes **b. No**

51. Would you rather hear on radio or TV:
a. a talk about moral leaders of our age? **b. a variety show?**

52. When talking in front of several people, do you sometimes stammer a bit, and find it hard to say what you want?
a. Yes **b. No**

53. Would you rather:
a. read a story of wild adventure? **b. actually have the adventure happen to you?**

54. Can you work out a hard problem better by:
a. wrestling it out on your own? **b. talking it over with parent or teacher?**

55. Would you rather spend free time:
a. by yourself, on a book or stamp collection? **b. working under others in a group project?**

56. Do you feel that you are getting along well, and that you do everything that could be expected of you?
a. Yes **b. No**

57. When you talk with your teachers, do you feel:
a. as if you are not as good as they had hoped? **b. quite at ease?**

58. Would you rather listen to:
a. a dance band? **b. a good speaker on modern world problems?**

59. Do you think that the way of doing anything that comes naturally to you is generally better than the way some teachers try to force on you?
a. Yes **b. No**

60. When a test or exam is over, do you:
a. just forget about it? **b. keep worrying about what sort of mark you'll get?**

61. When you read an adventure story, do you:
a. get bothered whether it is going to end happily? **b. enjoy the story as it goes along?**

(End, column 3 on answer sheet.)

62. Do you enjoy studying best:
a. in school?
b. at home?

63. "Sun" is to "shine" as "ship" is to:
a. anchor
b. float
c. roll

64. If Joan's mother is my father's sister, what relation is Joan's father to me?
a. Father
b. Brother
c. Uncle

65. When you do a foolish thing, do you generally feel so bad that you wish the earth would swallow you up?
a. Yes
b. No

66. Can you work hard on something, without being bothered by a lot of noise around you?
a. Yes
b. No

67. Do you often remember things differently from other people, so that you have to disagree about what really happened?
a. Yes
b. No

68. Do you enjoy having teachers tell you how to do things?
a. Yes
b. No

69. When you are ready for a job, would you like one that:
a. is steady and safe, even if it needs hard work?
b. has lots of change and contacts with amusing people?

70. Do you get on better with people who:
a. know exactly what their own views are?
b. consider everything very carefully and hesitantly?

71. If you found another pupil doing something you were told to do, would you:
a. force him to let you do it?
b. let him keep on until the teacher could come to decide?

72. Can you work just as well, without making mistakes, when people are watching you?
a. Yes
b. No

73. When you see something very sad in a play, do you:
a. find it hard to keep the tears away?
b. say, "Oh, this is just a lot of make-believe"?

74. In a trip with naturalists, would you find it more fun to:
a. catch birds and stuff them?
b. make artistic photos and paintings of birds on the wing?

75. If asked to use a spoon just used by someone else in the family, do you:
a. sometimes use it without wasting time washing it?
b. feel sick unless you wash it first?

76. Which of these changes in school would you rather vote for:
a. putting slow people in classes of their own?
b. doing away with unnecessary punishment?

77. Do your feelings change quickly, so that you suddenly feel sad and lonely for no good reason?
a. Yes
b. No

78. Would you rather be:
a. a builder of bridges?
b. a member of a travelling circus?

79. When you watch someone at work, do you often point out ways in which it could be done better?
a. Yes
b. No

80. Do you sometimes say silly things, just to see what people will say?
a. Yes
b. No

81. When you do badly in a game, do you:
a. say, "This is just a game"?
b. get angry and "kick yourself"?

(End, column 4 on answer sheet.)

82. Do you go out of your way to avoid crowded buses and streets?
a. Yes　b. No

83. Usually means the same as:
a. sometimes　b. always　c. generally

84. All firs are coniferous trees. All coniferous trees are evergreens. Which of these statements is true?
a. All firs are evergreens.　b. All evergreens are firs.　c. All coniferous trees are firs.

85. Are you satisfied that you do well enough what most people expect of someone of your age?
a. Yes　b. No

86. Do you think most people would go on obeying rules if there were no danger of being caught in stealing or cheating?
a. Yes　b. No

87. Have you ever enjoyed going around selling toys, books, candy, etc., to people?
a. Yes　b. No

88. When people interfere with your work, do you sometimes feel so angry you could hit them?
a. Yes　b. No

89. When you plan something, are you generally full of:
a. doubts, expecting things to go wrong?　b. hope, and sure that all will go well?

90. Would you rather spend some spare pocket money on:
a. a fashionable dance record?　b. a book to show how you could earn more pocket money?

91. When you are older and earn a living, would you rather:
a. be a team leader in a large organization?　b. have a freer job of your own where you can work as you please?

92. Do you sometimes feel unwilling to try something though you know it is not really dangerous?
a. Yes　b. No

93. Do you stand up before a group without looking nervous and ill-at-ease?
a. Yes　b. No

94. Which would you rather watch on a free evening:
a. car racing?　b. an open air (drive-in) musical play?

95. Do you think over and over about mistakes you have made, and how to avoid them?
a. Yes　b. No

96. Are you happier:
a. having constantly to learn new ways of doing things?　b. sticking to the old ways that you've learned to like?

97. Do you wish you could learn to be more carefree and lighthearted about your school work?
a. Yes　b. Not particularly

98. Are you, like a lot of people, afraid of lightning?
a. Yes　b. No

99. Do you ever suggest to the teacher a new subject for the class to discuss?
a. Yes　b. No

100. Do you sometimes like to while away the time just standing in a crowd and chatting?
a. Yes　b. No

101. When you are walking in a quiet street in the dark, do you often get the idea you are being followed?
a. Yes　b. No

(End, column 3 on answer sheet.)

102. **In discussion with your classmates, do you feel that you dislike telling them all your most private opinions?**
a. Yes **b. No**

103. **When people quarrel can they always be stopped if someone laughs them out of it?**
a. Yes **b. No**

104. **Look at these five words: mostly, gladly, chiefly, mainly, highly. The word that does not belong with the others is:**
a. mostly **b. gladly** **c. highly**

105. **Do you avoid borrowing things from people for fear you might damage them?**
a. Yes **b. No**

106. **When people around you laugh and talk while you are listening to radio or TV:**
a. can you listen without being bothered? **b. does it spoil things and annoy you?**

107. **Do you enjoy school so that you'd like to stay on a year longer than usual?**
a. Yes **b. No**

108. **Are you known among your friends for going "all out" for things that take your fancy?**
a. Yes **b. No**

109. **Do you have gifts and possibilities in your personality that you have never shown people at all?**
a. Yes **b. No**

110. **If a person asks directions, do you:**
a. tell him quickly and easily, and let him figure it out if he is slow? **b. repeat it two or three times and perhaps start out with him?**

111. **When you see a movie about a daring robber, do you often hope he won't get caught in the end?**
a. Yes **b. No**

112. **Do people still treat you as if you were younger than you actually are?**
a. Yes **b. No**

113. **Are you sure your friends never speak badly of you behind your back?**
a. Yes **b. No**

114. **Do you dislike going into narrow caves or climbing to high places?**
a. Yes **b. No**

115. **Do you think it is wrong for high school boys and girls to go out to movies as often as twice a week or more?**
a. Yes **b. No**

116. **Do you think a dog loves you all the more if you are a stern master and make it behave?**
a. Yes **b. No**

117. **Do you find it easy to go up and introduce yourself to an important person?**
a. Yes **b. No**

118. **Do you think that the average committee of your classmates often reaches silly decisions and also takes too much time?**
a. Yes **b. No**

119. **Would you prefer to read:**
a. the classic *Legends of Greece and Rome?* **b. the *Story of Al Capone,* a Chicago gangster?**

120. **Do you sometimes go on and do something you much want to do, even though you feel a bit ashamed of yourself?**
a. Yes **b. No**

121. **Which do you think people should vote more important:**
a. building good roads? **b. painting lovely pictures?**

(End, column 6 on answer sheet.)

122. Do you feel hurt if older people do not take your ideas and opinions seriously?
a. Yes b. No

123. When a new teacher comes to your class, does he or she pretty soon notice who you are and remember you?
a. Yes b. No

124. Look at these five words: under, above, beside, behind, between. The word that does not belong with the others is:
a. under b. between c. beside

125. Is it easy for you to eat a big meal just before an exam (or something upsetting)?
a. Yes b. No

126. Have you ever practically fainted with excitement or strain?
a. Yes b. No

127. Can you easily switch your interest from one sort of work to another, or from play to work?
a. Yes b. No

128. Do you think most teachers are too particular about having things done "just so"?
a. Yes b. No

129. Do you try to be careful what you say, so that you could not possibly hurt anyone's feelings or startle anyone?
a. Yes b. No

130. If you were working with groups in class, would you rather:
a. walk around to carry things from one person to another? b. specialize in showing people how to do one difficult part?

131. Do you take trouble to be sure you are right before you say anything in class?
a. Usually b. Not usually

132. Do people say, "You are in a mean mood today," as if you disliked people and were unkind to them?
a. Yes b. No

133. Do you feel that people are generally helpful and attentive when you most need it?
a. Yes b. No

134. Do you think people should spend more time in school making their handwriting:
a. neat and artistically attractive? b. simple and easy to read?

135. If you were on a trading ship, would you prefer the job of:
a. speaking to the natives at each port? b. navigating across the ocean?

136. When you write an essay, do you prefer the teacher:
a. to give the class the title and let you follow your ideas, each person on his own? b. to put you in small groups and let you decide together what to do?

137. Do you sometimes dislike yourself because you have blurted out what you felt like saying at the time, when it should not have been said?
a. Yes b. No

138. Do people sometimes say that you talk about your affairs a lot with many people?
a. Yes b. No

139. If you were not a human being, would you rather be:
a. an eagle on a far mountain? b. a seal, in a seal colony by the seashore?

140. Do you think it is a good thing for all people to learn to hide their feelings?
a. Yes b. No

141. Do small troubles sometimes "get on your nerves", even though you know they are not very important?
a. Yes b. No

142. Are you sure you have answered *every* question?
a. Yes b. No

LABORATORY OF PERSONALITY ASSESSMENT AND GROUP BEHAVIOR
RESEARCH INTO STUDENTS' INTERESTS AND ACHIEVEMENT: UNIVERSITY OF ILLINOIS

STUDENT RATING SCALE
(Confidential. For research purposes only)

Name of student______________________________ Age ___years ___months

School______________________________ Class__________ Today's date______

Name of teacher completing this form____________________________________

1. Interest in games and sports. Please mark the scale below at the point which seems to describe the student's degree of interest in games and sports most accurately. Then mark the remaining scales inthe same way to describe his (her) other interests and characteristics.
Try to use the whole range of the scales, and not just the center segments.

Hardly any interest at all	Definitely less interested than the average student	Somewhat less interested than the average student	Just about average interest	Somewhat more interested than the average student	Definitely more interested than the average student	Exceptionally interested

2. Achievement at games and sports

Exceptionally poor achievement	Definitely lower than average	Somewhat lower than average	Just about average achievement	Somehat higher than average	Definitely higher than average	Exceptionally good achievement

3. Social Adjustment

Doesn't get along at all well with other students	Definitely doesn't get along as well as most	Doesn't get along particularly well	Just about average in getting along with other students	Gets along pretty well with other students	Definitely gets along better than most	Gets along exceptionally well with others

4. Leadership

No signs of leadership ability	Definitely low on leadership	Somewhat below averaverage	Average leadership ability	Somewhat above average	Definitely high on leadership	Outstanding as a leader

5. Behavior Record

Very often in trouble	Definitely worse than average	Somewhat below average on behavior	Average standard of behavior	Somewhat above average	Definitely above average	Almost too well behaved

6. Interest in school subjects in general

I	I	I	I	I	I	I
No interest in school subjects	Definitely less interest than average	Somewhat less interest than average	Average Interest in school subjects	Somewhat more interest than average	Definitely more interest than average	Exceptional interest in school subjects

7. Personal Adjustment

6

I	I	I	I	I	I	I
Nearly always seems disturbed or miserable	Definitely below average	Somewhat below average	Just about average personal adjustment	Somewhat above average	Definitely above average	Nearly always seems calm and happy

8. Interest in particular school subjects. Pick out the three school subjects in which you think the student is most interested. Put a figure "1" beside the subject in which he is most interested of all, a figure "2" beside the subject which seems to be his second main interest, and a figure "3" beside his third interest.

Math___ Science___ Languages___ English___ Art___ Music___

Handicraft___ Geography___ History___

9. Any other information about this student which you think useful for a study of interests and achievement.

LABORATORY OF PERSONALITY ASSESSMENT AND GROUP BEHAVIOR
UNIVERSITY OF ILLINOIS

STUDENT INTEREST QUIZ

Name of student______________________________ Age ___years ___months

Name of school_______________________ Class_____ Today's date__________

1. How many hours a week out of school do you usually spend on the following?

   Reading? ___________________________

   Watching television? _________________

   Listening to radio programs?____________

2. What kind of television programs do you like best?

   _quiz shows _sports _westerns _news _____________other (What kind?)

3. Name your three favorite sports or hobbies.

   1. _________________ 2. _________________ 3. _________________

4. How many hours each week do you usually spend on these sports or hobbies?

   1. _________________ 2. _________________ 3. _________________

5. What job would you like to have when you finish school? _________________

6. Do you think you will be able to get this kind of job? _________________

7. If not, what kind of job do you think you will get? ____________________

8. Who are your best friends in your class?

   1. _________________ 2. _________________ 3. _________________

9. How many brothers and sisters do you have? ___ ______________________

10. What is your position in your family? _______________________________
    (Oldest child, second oldest, third, etc.)

Your Name ____________________

Your Number __________________

STUDENT COMPATIBILITY POLL

The students with whom I wish to associate (Choose as many as you wish)	Students about whom I am neutral (Choose as many as you wish)	The students whom I wish to avoid (Choose as many as you wish)

INFORMATION TEST

Which of the following words suggests lack of self control?

hep
square
touchy
gone

(Attitude measure: Self control)

Which sweater costs more?

nylon
cashmere
lamb's wool
orlon

(Attitude measure: Nice clothes)

The baseball world series is usually played in what month of the year?

September
July
October
August

(Attitude measure: Team win)

A girl who is too friendly with boys is most likely to be called:

popular
political
fast
silly

(Attitude measure: Good reputation)

You would be most likely to get a croquet set in:

a sports shop
a book store
a hobby shop
a music shop

(Attitude measure: Have games, books, etc.)

PAIRED WORDS
(Word Association)

- - - - - - - - - - -

(as administered in test)		(Attitude measure)
Lose	Tempar	Self control
	Money	Save money
Bobby	Sox	Nice clothes
	Pins	Handsome
Free	Throw	Team win
	Ticket	See movies
Square	Honest	Good reputation
	Dumb	Be popular
Box	Tool	Take things apart
	Toy	Have games, toys, etc.

HOW MUCH AND HOW MANY?

(Autism)

The Reverend John Hodge's sermon on "Self Control for Children" sold the following number of copies?	100 1,000 10,000 50,000 100,000

(Attitude measure: Self control)

How much money a year should be spent on clothes for each child?	$25 40 65 100 More than $100

(Attitude measure: Nice clothes)

About how many times has the Yankee Ball Club won the World Series?	3 6 9 12 15

(Attitude measure: Team win)

The number of children who believe they will get caught if they steal is:	none few some most all

(Attitude measure: Good reputation)

How many children will share or give away a good game or book?	1 in five 2 in five 3 in five 4 in five all

(Attitude measure: Have games, books, etc.)

MEMORY

- - -

(words exposed for memorizing)

Date

Glue

Tell

Shading

League

Bank

Rest

Invitation

Unselfish

Defend

(list - on another page-- for recall)

Already
Tell
Gloomy
Rest
Bulk

Conceit
Date
Bank
Blind
Melt

Most
Invitation
League
Outline
Century

Cocoon
Glue
Unselfish
Church
Central

Coast
Minute
Defend
Shading
Support

Appendix II

Auxiliary Tables

Initial Structuring of Interests. Complete Rotated Matrix and Reference Vectors

List of 110 Variables Used in Initial Structuring of Interests

Correlation Matrix of Ability, Personality Interest and Achievement Variables, Directly Scored (a) Urban: Springfield. N = 153

Correlation Matrix of Ability Personality, Interest and Achievement Variables, Directly Scored (b) Rural: Paxton. N = 124

Correlation Matrix of New Arrangement of Ability, Personality, Interest and Achievement Variables on Combined Urban and Rural Sample. N = 277

The 36 Factor Centroid Matrix for the Combined Sample

The 36 Factor Reference Vector Intercorrelations at Simple Structure

Centroid of Checking Study on Dynamic Structure of 72 Attitude Variables

Correlations of Reference Vectors for Integrated and Unintegrated

Appendix 1A

The 110 Variables Used For Determining Factor Structure Across Modalities

1. Teacher rating--Interest in games and sports.
2. Teacher rating--Achievement at games and sports.
3. Teacher rating--Social adjustment.
4. Teacher rating--Leadership.
5. Teacher rating--Behavior record.
6. Teacher rating--Interest in school subjects in general.
7. Teacher rating--Personal adjustment.
8. Student Interest Quiz--Reading.
9. Student Interest Quiz--Television.
10. Student Interest Quiz--Radio.
11. Student Interest Quiz--Total time at sports.
12. Student Interest Quiz--Outdoors.
13. Student Interest Quiz--Siblings.
14. Student Interest Quiz--Position in family.
15. Student Interest Quiz--Popularity.
16. Achievement quotient.

Variables From HOW MUCH AND HOW MANY Interest Test

17. I want to be the type of person everyone likes to have around.
18. I want always to show self control.
19. I want to have Mother there if something goes wrong.
20. I want my younger brothers and sisters to behave and mind me.
21. I want to make things and draw pictures related to our school subjects.
22. I want my pictures to be beautiful and pleasant to look at.
23. I want to get even with other kids who have caused me trouble.
24. I want to spend more time with my girl friend or boy friend.
25. I want the United States to Protect small countries from Russia.
26. I want to worship God and obey him.
27. I want to go to games with my friends.
28. I want to save money in a bank.
29. I want to see more science fiction movies and T.V. programs.
30. I want nice clothes so that people will like the way I look.
31. I want to have more holidays in order to rest and take it easy.
32. I want to be polite to adults.

Variables From PAIRED WORDS Interest Test

33. I want to be the kind of person everyone likes to have around.
34. I want always to show self control.
35. I want to have Mother there if something goes wrong.
36. I want my younger brothers and sisters to behave and mind me.
37. I want to make things and draw pictures related to our school subjects.

Appendix 1A Continued

38. I want my pictures to be beautiful and pleasant to look at.
39. I want to get even with other kids who have caused me trouble.
40. I want to spend more time with my girl or boy friend.
41. I want the United States to protect small countries from Russia.
42. I want to worship God and obey him.
43. I want to go to games with my friends.
44. I want to save money in a bank.
45. I want to see more science fiction movies and T.V. programs.
46. I want nice clothes so that people will like the way I look.
47. I want to have more holidays in order to rest and take it easy.
48. I want to be polite to adults.

Variables from INFORMATION Interest Test

49. I want to be the kind of person everyone likes to have around.
50. I want always to show self control.
51. I want to have Mother there if something goes wrong.
52. I want my younger brothers and sisters to behave and mind me.
53. I want to make things and draw pictures related to our school subjects.
54. I want my pictures to be beautiful and pleasant to look at.
55. I want to get even with other kids who have caused me trouble.
56. I want to spend more time with my girl or boy friend.
57. I want the United States to protect small countries from Russia.
58. I want to worship God and obey him.
59. I want to go to games with my friends.
60. I want to save money in a bank.
61. I want to see more science fiction movies and T.V. programs.
62. I want nice clothes so that people will like the way I look.
63. I want to have more holidays in order to rest and take it easy.
64. I want to be polite to adults.

Variables from MEMORY Interest Test

65. I want to be the kind of person everyone likes to have around.
66. I want always to show self control.
67. I want to have Mother there if something goes wrong.
68. I want my younger brothers and sisters to behave and mind me.
69. I want to make things and draw pictures related to our school subjects.
70. I want my pictures to be beautiful and pleasant to look at.
71. I want to get even with other kids who have caused me trouble.
72. I want to spend more time with my girl or boy friend.
73. I want the United States to protect small countries from Russia.
74. I want to worship God and obey him.
75. I want to go to games with my friends.
76. I want to save money in a bank.
77. I want to see more science fiction movies and T.V. programs.
78. I want nice clothes so that people will like the way I look.
79. I want to have more holidays in order to rest and take it easy.
80. I want to be polite to adults.

Appendix 1A Continued

Variables From OPINIONS Interest Test

81. I want to be the kind of person everyone likes to have around.
82. I want always to show self control.
83. I want to have Mother there if something goes wrong.
84. I want my younger brothers and sisters to behave and mind me.
85. I want to make things and draw pictures related to our school subjects.
86. I went my pictures to be beautiful and pleasant to look at.
87. I want to get even with other kids who have caused me trouble.
88. I want to spend more time with my girl or boy friend.
89. I want the United States to protect small countries from Russia.
90. I want to worship God and obey him.
91. I want t o go to games with my friends.
92. I want to save money in a bank.
93. I want to see more science fiction movies and T.V. programs.
94. I want nice clothes so that people will like the way I look.
95. I want to be polite to adults.

SUMMATED 'A' INTERESTS Variables from 5 Interest Tests

96. I like to eat well so that I shall grow healthy and strong.
97. I like to see a handsome face and figure in the mirror.
98. I want to have a good reputation for ideals and honesty.
99. I want to show my father how awesome and admirable I think he is.
100. I want to be safe at home when the weather is bad.
101. I want to read about the world.
102. I want my teacher to like me.
103. I want to spend more time with my friends.
104. I want to go to parties where couples are invited.
105. I want the United States to beat its enemies.
106. I want to pray for God's protection and mercy.
107. I want my team to win.
108. I want to have a pet to take care of.
109. I want to have plenty of games, books and other things.
110. I want to dress well in order to impress the opposite sex.
111. I want to take things apart to see what makes them work.

EXPERIMENT ONE: OBJECTIVE MOTIVATION MEASURES *

Obliquely Rotated Vector Solution Via Procrustes
N = 154 - Springfield

Be popular - Autism	+20+22+26+13-03+12-12+12+11-07+06+11+01+09+23+08+29+23+17+16-10+04
" " - Paired Words	+05+16-19+07+03+09+20+05-09-16-00+16+11+08-01+18+22+06+08+02+03+01
" " - Information	-08+01+22-01+03+02-17+05+22+11-03-06+08-02+08+08+16+01+04+16-02-10
" " - Memory	+55-14-06+06+01+00+02+00-17+09-04+03+08-07+03+01-06-07+12+08-01-02
" " - Reaction Time	+10+22+02+07+13-00+02+01-07-07+13-18+11+04-05+01-02+22-05+10-04-01
Good reputation - Summated	+38+03+12-04+02+17-03-11-10+08+04+01+06-02-07+04-00+09+07-01+05+00
Self control - Autism	+21+13+03+04-07+05-01-10-01-01-01+01-12-08+13-04+09-14-09+15-13-01
" " - Paired Words	-14+16+17-05-03-06-12+02+14-06+19-02-10-09+20+11-12-12+05+02+10+07
" " - Information	-07+35+04+05+04+08-04-14+14-07-05-02+08+12+12-03+10+05-06+04-04+11
" " - Memory	+09+16-02+20-06+18+06-03+07-00+02-02+09+01+06-18+08-00+22+04+17-00
" " - Reaction Time	+02+09-01-08+01+01+23-15+03+05+18-05-02-02-01+07-13+10-12-02+01+04
Admire father - Summated	-04+37+02+06+15-07-03+01-07+14+07+05+06+07+04-05+12-00+07+04+01+03
Mother there - Autism	+01-03+24+05+04+06-26-04+01-32-04-05+03-10+02-02-08-08-08+21+04-07
" " - Paired Words	-08-03+21+04+04+06-26-07-01+12+03+12-13+17+02-04-03+09+11+17+02+04
" " - Information	-04+03+30+08-02+17-14-26-17+18+02+07-05+03+00-04+13-01-04-03+01-00
" " - Memory	+04+09+05-08-03-07+05+04+17+22+14+06+06+08+09+06-02+04+31-11+13-03
" " - Reaction Time	+16+06+11-14+03+08-08+04+03-06+05-05+14+02-07+07-02+52-05+02+09-06
Teacher like me - Summated	+06+04+22-11-00-11-17+12+07+10+02-12+10+07-01+12+05+09-01+06+03-00
Sibs mind me - Autism	+03+15-01+10-04-06+05-05+19-04-09+03-11+16+02+03-06+06+02+30+06-00
" " " - Paired Words	-00+05+06+10+05+16-21+01-07-08+05+09-08-04-12-08-07-11-03-12+02-02
" " " - Information	-02+06+07+20-03-09-11-01-18-19-01+09+04+12+01-10+11+08+04+17+15+03
" " " - Memory	+13-20-05+18-15+15+17-04-08+04-15+00-05+00+08+10-09-13+29-10+11-10
" " " - Reaction Time	-01+10+08+15-02+04-07-00-03+06-15+01+01+13+03-24-03+28+03-03+05-05
Pet to take care of - Summated	+08+11-03+30-03+05+03-11+01+03-17+02+09+05-01-03+02+14+11+04+12+02
Make things and draw - Autism	+02-05+16-03+23-00-14+17+07+16-01+05+03+12+12+19+10+12+02+31-00-07
" " " " - Paired Words	+02+17-00+06+09-03-01-08+01-10-10-05+04-07+23+13+13+09+03+01-01-03
" " " " - Information	+00+11-02-05+24+12+04+10-00+02+03+05+13+09+08+12+27-04-05+08-05-03
" " " " - Memory	+10-07-04+08+20-03-01+15-03-12-05+08+12+22-08+17+05-13+27+02+04+02
" " " " - Reaction Time	+02+08+06+08+03-05-01-02-08+11+08-03+05+03-04-04-16+53-07-09+20+08
Take things apart - Summated	+07+05-08+01+24-08+15-02+22-04-02+08+07-14-02+08-15+07+16+08+00-19
Beautiful pictures - Autism	+08+09+05+08+02+30-00+02+17+03-01-09-14+02+02+07+08-19-13+24-00-03
" " - Paired Words	[illegible]
" " - Information	-06+09+09+11-09+22-01+01+08-02+08-06-04+10+00+07+36-13-11+04+00+06
" " - Memory	-13+02+01+09+04+37+05-02+01+01+09+17-06+10+00+03+03-15+32+01+03-04
" " - Reaction Time	-04-13+05-04+06+03+02+00-02-03-12+04+09-07-09+26+06+18-18+00+05-03
Read about world - Summated	+21+09+15+13+07+21-09-11-05-02+10+06+13+04-03-01+10-01+07+03+12+10
Get even - Autism	+01+03-21+02+12+08+21-05+06+06+05-08-17+19+07-12+01-01+10+34-17+00
" " - Paired Words	+01+02-18-25+01+09+30-01+09-04+12-04+02+03-07+04-03+06+09-07+02+02
" " - Information	+07+13-07+10+05+10+33-13+11+07+02+04+15+02+07-04+24+07+03-06+03+07
" " - Memory	+08-15+10-05-18-07+04-12-01+12+10-04-01+22-10+05-06-03+27+08+03+05
" " - Reaction Time	-00-09-03-04-00+02+16-04-01+07+08+17+09-18+23-11-08+60-00+06+16+04
U.S. beat enemies - Summated	-07+02-06-09+10+07+26-15+20-04+02-03-08+03+17+02+08+07+02+14-04+01
Girl or boyfriend - Autism	-10-14-17-11+09-18+04+47-19-16-05-02+12+02+04+07-02-00-08+32+01-06
" " " - Paired Words	+03-03-06-15-00+17+04+31-05-08+24+02+08+09-07+05+12+08+03+00-02-02
" " " - Information	+04-03+09+05+19+07-06+31-09+05-02+06+06+09+16+06+28-09-05+14-07-04
" " " - Memory	+16-09+13+01+07-08-02+08+02+16-02-09+11+00-00-01-05+02+16+01+13-17
" " " - Reaction Time	-01-02+06-04+01-13-05+31+06+04+08+00+13-01+05-11-05+61-10+01+02-01
Parties where couples invited - Summated	+02-04-06+09+01-01-06+32-01-03+05+01-02-00+01+20-12+03+12-05+00-02

Appendix 2 (Continued)

Protect small countries - Autism	-05-04+00-01+14+03+04+12+25-05+12-00+02-03-02+16+07-02-08+25+04+03
" " " - Paired Words	+03-16+09-14-02+08+02+01+11-01+26+02-04+04-10-13-07+04-01+09+01+01
" " " - Information	-14+04+01-04-00-04+01-02+34+03-02+10+01+18-15+12+25-09+00-17-08+01
" " " - Memory	-04+09-13+06-00+05+24-04+07+06-08-04-04+17+19-04+03-10+34+19-03-05
" " " - Reaction Time	-07-01-00-08-00-02+06-01+19+05+10+00-07+10-05+03-03+45-10+04+02+17
My team win - Summated	-10+18-02-04-01-08+07+15+47-01+18-12+02-08+08-09-05+10+03+08+02-01
Worship God - Autism	+16-05-06+02-09-05+01-05+01+10+14+08-28+03-07-03-16-07-05+36-11+18
" " - Paired Words	+09+07+20-13+04+08-10-09-11+50+00-10-14+05+22+06+05+16+09-14+00-04
" " - Information	-00-09-05-07+03-01+15-01+04+09+03-03+00+09+00-09+15-05-09+04-18+03
" " - Memory	-07+01-04+06+04-12+09-02+13+23+05+01-02+07+04-07-11-12+29-23+05-05
" " - Reaction Time	-01-08+03+01-05+03+05+04+04+09+02+04+02-02+18-03-02+64-02-02+09+02
Pray to God - Summated	+09+10+15-01+01-10-10-13+03+24-03+03+03+26-09-02+16+05-01-04-00+12
Games with friends - Autism	+05+07+15+04-02+02-12+13+17-04+20-02+15+06-04-08+11-05+00+36+03-00
" " " - Paired Words	-10+07+01-15+02+16+09+06+24-01+54+08-01-02-16-05+02+03-04+01+04+17
" " " - Information	+12+23-13-11-07-01+15-14+03+01+25+17+07-05+12-04+27-12-05+00+01+39
" " " - Memory	+09+04+13+02+03+10-10-07-06+04+02+03-01+17-03+02-00-07+28+09+02-01
" " " - Reaction Time	-01-07+16-07-05-07-02+04+01+11+07-14-08+17+05-04-15+35-05+06-06-06
Time with friends - Summated	+19+04+01+04+02-02+04+08+03+10+17+02+01-23+11-00-04+10-03+09+00-03
Save money - Autism	+06+02+05-10+03-01+01+09-10-12+06+14+16+09+03-02+11+04+06+34+03-01
" " - Paired Words	-01-06-09+20+03-01-02-04-06-06-02+14+02-05-11+06+06+02-01-10+02-11
" " - Information	+00+10+21-31+00+14-02-18-05+06+06+09+17+08+09+20+39+00+08-03+01+07
" " - Memory	+24+17+08+04+07+06-13+00+02+16+10+17-10+06+06-01-01-05+21+07+00+03
" " - Reaction Time	-05-07-03+08+06+02-00+13+16+04+09+17-03+16-09+08-11+45+06-07+13+07
Safe at home - Summated	-06+04-09+13+03+17+13+01+11-02+13+19-04+14+03+08+04+11+10+03+17+23
Science fiction - Autism	-00+03+04+14+05+16-02+00-03-23+01+04+26-02-16-04+06+00-04+27+25+04
" " - Paired Words	+03+04+09+08+06-05-10-14+15-06+06+18+12-00-14+02-01-04+00+16-03-06
" " - Information	+07+17-04-16+05-01+04+15+00-07-04-09+35-15+08-00+42-18-01-02-01-07
" " - Memory	+04+17+09+15-04-06-11-04-04+03+00-07+08+06-02-03-02-15+20-11+08-00
" " - Reaction Time	+08+05+03+01+17-10-01+14-05-01-01+04+34+02+05+06+03+62-06-11+18-02
Games and books - Summated	+11-17+10-01-01-06-01+03+06-12+05+09+30+08-15+10+05+07+07-06+03-05
Nice clothes - Autism	+07+00+14-09-02+06-06-08-07-04-05+01-04+06-14+12-04+01+01+51-02-02
" " - Paired Words	-16-03-03+14-02-04+04+12-06-01+02+21+01+25-08-11+03+18+02+13+05-00
" " - Information	+07+05-25-12+09-04+11+17+00-04-09+04-07+08-00+04+28-12-07+05-26+05
" " - Memory	-06+05+16-03+11+04-08-03+02+13+01-02-03+39+01+10+04-07+30-03+02+01
" " - Reaction Time	-06+08+13+14-03+08-13+10+01-05-04+14-02+10+07+10-03+45-00+04+22+03
Dress well - Summated	+09+05-03+10-01+12+07+02+12+12+01-01+00+35-13-05+18+13+09+10-02+08
More holidays - Autism	-14+16+12-09-12+03-02-17+02+03+15-00-04-14+04-13+11-06-06+24-11-00
" " - Paired Words	-10+19-08-02+05-05+08+06+03+10-04-11-08-02+52-09+21+02-02-07-02+06
" " - Information	+23-13-05-16+02-11+04-03+03+02+02+22+06-13+10+02+23-09-11-01-13+09
" " - Memory	-01+00-05-02+02+03+02+05-06+05-15+04-18+09+23+12-24-04+37+03-00-06
" " - Reaction Time	+07+13+10+07-06-09-02-11-03+01-10+05+17+03-04-01-01+52-08-10+15-03
Eat well - Summated	+19-06+12+02+17+13-02+10-03+09+00-06+06-06+25+25+03+12+07+06+08-05
Polite to adults - Autism	-02+09-02-12+07-27-02+12-13+03-08+17+12-03+17+08+05-03+01+29+04+05
" " " - Paired Words	+10-03-07+06+04+03+02+07-03-03+03+11-04-07+08+10-02+01-01-00-06+06
" " " - Information	-07+04+15-06+29+10-03-04-01+09-03+08+01+16+08+30+23-07+02-06+05-02
" " " - Memory	+16-08-06-00+09+07+07+14+04-06-02-05+19+05-16+01-10-14+32+01-02-20
Handsome face and figure - Summated	+08-14+07-13-06+04-04+15+10-08-06-03+03-01-03+37+06+05+03-02+01-02

* Variables have been rearranged in accordance with the pattern of drive structures found.

Appendix 3

Correlation Matrix of Ability, Personality, Interest
and Achievement Variables, Directly Scored - Urban:
Springfield. N = 153

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
1		77	32	45	16	30	32	-02	-10	12	09	26	-12	-03	17	25	05	02	10	-05	19	07	-08	05	11	-03	10	20	04	10	15	12	11	13	07	-00	04	-11	-00	08	04	-08	03	03	-03	14	15	-09	26	10	13	01	06	30	-08
2	77		42	50	25	38	42	06	-13	07	02	15	-09	-01	27	35	06	11	05	-06	31	03	-06	02	12	04	13	20	-10	09	10	19	14	14	09	03	04	-20	-17	07	06	-01	01	13	03	24	15	-11	26	06	15	05	-02	27	-08
3	32	42		74	59	65	74	15	-13	-08	-07	06	-11	-03	34	32	14	13	06	-06	26	03	02	-09	-04	02	05	10	-20	02	09	14	02	03	-05	16	10	-18	-19	-06	-03	01	-18	08	-01	09	09	-10	15	15	21	02	05	19	02
4	45	50	74		47	73	75	21	-19	-00	08	16	-14	-06	35	51	13	16	06	-04	16	-00	-04	-04	04	-07	03	15	-18	05	11	18	09	03	02	10	12	-12	-21	-02	-10	-08	-11	19	03	14	07	-01	16	24	25	-04	11	27	07
5	16	25	39	47		44	53	05	-21	-10	-17	-05	-15	-20	14	07	07	09	06	-21	08	-03	03	-01	-07	-09	-01	04	-18	-02	00	14	-07	02	06	14	01	-08	-17	04	-00	01	-15	06	-15	09	14	-14	-09	-02	10	03	05	10	-03
6	30	38	65	73	44		78	24	-08	-12	09	14	-18	-05	35	57	07	19	13	-09	23	-03	06	-07	08	-12	04	11	-15	-04	02	14	11	12	07	17	15	-07	-25	-04	-07	-08	-12	28	03	11	18	05	22	33	29	-05	21	25	06
7	32	42	74	75	53	78		24	-11	-05	01	11	-12	-07	33	41	08	19	15	-10	24	-08	-01	-00	08	-11	-01	07	-15	-04	07	10	06	09	06	24	13	-11	-19	-01	-01	-10	-11	24	11	13	16	-07	19	30	20	-06	12	25	08
8	-02	06	15	21	05	24	24		26	19	33	10	-08	02	03	27	04	02	02	-11	08	-01	-04	09	-01	-05	03	09	05	-01	-02	11	07	01	04	-03	-07	-14	-12	09	-02	-09	-03	19	-00	06	-08	-02	15	15	07	-08	24	12	06
9	-10	-13	-13	-19	-21	-08	-11	26		26	22	05	10	19	-02	-09	13	02	04	-11	03	01	10	03	00	-03	07	05	12	14	07	01	-04	03	03	-09	-06	12	10	08	03	03	10	-11	-09	-11	-08	02	09	08	-04	-07	07	-09	09
10	12	07	-08	-00	-10	-12	-05	19	26		28	26	01	12	09	-01	08	-08	00	-03	01	-00	-17	03	01	04	-03	13	06	16	-05	06	14	-01	-11	-02	-02	05	06	21	-14	-09	04	01	-04	-06	-10	10	-12	03	-06	02	-08	07	-09
11	09	02	-07	08	-17	09	01	33	22	28		59	-13	-00	12	20	-01	00	08	-06	-04	-10	-12	02	05	-03	-02	03	10	-03	08	08	11	14	04	02	09	02	-03	02	-05	-10	04	18	-10	05	07	04	03	10	10	08	-01	10	11
12	26	15	06	16	-05	14	11	10	05	26	59		-10	06	20	13	-03	11	09	-04	08	03	-14	01	04	02	00	-00	-06	03	01	09	03	08	-05	-05	10	-09	01	-01	01	-07	03	14	-04	07	06	14	04	09	11	07	-15	16	-01
13	-12	-09	-11	-14	-15	-18	-12	-08	10	01	-13	-10		47	01	-13	-02	06	-00	-02	-07	08	04	00	05	12	11	01	06	24	03	-05	-11	-08	05	-07	-11	11	01	08	04	11	01	-11	12	-13	-24	16	00	-15	05	-05	-05	-08	-03
14	-03	-01	-03	-06	-20	-05	-07	02	19	12	-00	06	47		04	05	-05	03	10	01	14	06	-00	01	-00	13	15	-01	-01	13	04	-02	-01	-09	-02	04	11	03	-04	07	-07	-04	-04	-05	18	01	-14	22	06	02	02	-02	09	02	-02
15	17	27	34	35	14	35	33	03	-02	09	12	20	01	04		20	05	08	-05	06	17	02	07	12	00	06	06	13	-18	01	07	05	12	18	01	-03	14	-02	06	19	11	01	13	01	-03	10	08	05	-02	05	-03	-09	03	09	-17
16	25	35	32	51	07	57	41	27	-09	-01	20	13	-13	05	20		-02	22	16	05	30	13	-11	01	11	-05	10	22	-05	04	02	20	28	14	09	11	21	-14	-17	04	-03	-08	-08	28	17	23	04	01	31	31	30	00	24	36	10
17	05	06	14	13	07	07	08	04	13	08	-01	-03	-02	-05	05	-02		14	10	-04	02	13	01	01	-05	-04	-05	-01	-03	-07	-05	05	-05	04	09	06	-08	04	-06	-01	-03	03	-13	06	-16	03	-00	-11	-15	-11	04	-03	04	-06	-09
18	02	11	13	16	09	19	19	02	02	-08	00	11	06	03	08	22	14		07	14	04	17	-01	03	01	-03	-00	06	-13	04	15	05	06	05	-00	01	06	14	-00	01	-06	05	-09	03	-04	04	09	08	04	11	07	05	-04	14	08
19	10	05	06	06	06	13	15	02	04	00	08	09	-00	10	-05	16	10	07		11	03	02	-05	07	05	-07	07	08	20	04	04	-06	-19	13	15	01	09	15	-03	-03	13	-21	03	-03	-03	-07	06	-06	07	11	-05	18	17	-04	-03
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54	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
66	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
69	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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86	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
89	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
92	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
97	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
99	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
101	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
102	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
103	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
104	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
105	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
106	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
107	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
108	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
109	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
110	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
111	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Appendix 3 (Continued)

56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
29	14	23	17	16	29	11	15	15	-01	26	23	26	26	22	31	30	28	18	18	20	24	31	16	19	04	-02	01	-03	04	10	11	09	17	18	16	08	02	16	-01	25	26	14	20	20	28	29	32	28	18	16	34	15	23	22	17
37	05	16	09	11	29	18	19	20	07	20	21	24	26	08	32	35	17	18	17	22	29	21	15	19	01	-13	-04	-02	01	08	04	10	12	12	15	06	02	16	-05	28	27	15	24	13	17	28	36	27	08	21	24	12	23	17	17
35	08	29	16	07	23	26	25	18	18	11	07	15	21	06	19	19	19	20	19	17	24	23	09	26	11	-03	06	09	05	02	-05	08	13	09	20	-00	01	05	04	22	17	19	26	12	18	28	29	25	09	30	12	19	23	25	18
48	23	40	17	22	25	23	22	30	10	15	15	20	30	10	26	25	26	24	20	22	35	33	13	20	13	06	08	04	01	14	-07	09	21	12	24	07	07	12	07	34	29	21	34	24	31	30	29	29	15	36	19	23	36	26	22
21	-08	27	-00	-05	09	17	17	01	12	02	05	17	03	01	13	16	10	14	14	09	20	16	09	10	05	-11	-04	-03	-08	-06	-09	06	01	-02	15	-11	-03	-07	-09	06	07	10	12	-02	09	15	11	20	-01	20	-13	02	15	10	00
43	19	34	28	21	27	29	31	30	24	26	20	27	35	11	23	26	23	27	28	32	36	40	18	24	17	-05	07	09	-04	11	-08	07	17	12	18	08	12	08	05	41	28	27	29	21	40	30	31	33	26	40	21	31	37	35	22
38	16	26	17	17	25	31	30	23	05	15	10	19	24	14	14	17	15	21	23	23	30	20	11	20	13	-08	05	13	-05	12	-07	10	19	08	15	06	06	10	03	25	23	25	31	20	28	22	26	26	20	32	19	21	31	25	27
24	08	23	21	21	16	18	18	19	06	-01	04	04	22	11	14	-04	06	07	04	11	07	11	06	15	01	-03	-04	05	-03	02	03	04	04	03	03	08	12	06	06	11	20	22	10	21	20	15	00	11	-03	30	04	10	18	14	-02
-04	-05	03	14	13	04	05	-00	-04	05	04	-06	-06	03	14	05	-17	02	-14	00	01	-10	03	13	11	00	-04	-04	-02	01	-03	13	-01	10	02	-04	01	-01	-04	-08	09	12	14	-01	15	00	03	-03	08	00	-03	01	04	-05	04	-10
-05	01	-02	03	05	07	17	04	10	05	-08	-03	06	07	-02	09	-05	-14	-15	-00	00	-01	-10	-04	-00	00	-01	03	07	09	20	-01	01	14	-01	02	07	04	12	03	10	15	11	-04	06	15	14	04	11	-06	10	-03	02	00	00	00
03	10	06	27	26	08	-02	05	07	-05	06	09	08	26	00	08	-01	11	02	08	05	17	13	12	-01	08	10	03	-01	09	03	16	09	16	14	04	17	13	13	15	08	15	09	15	26	16	09	02	14	14	15	13	15	15	08	02
05	10	07	16	14	05	06	13	01	-05	05	06	01	08	-09	14	02	02	-04	05	-02	11	-03	-00	-11	01	08	14	01	15	15	18	16	27	21	11	12	14	21	18	11	18	07	04	06	07	14	10	18	08	08	20	13	13	07	-03
-16	-14	-13	-10	03	-06	-08	-13	-12	-04	-15	-07	-16	-22	-06	-01	-21	-21	-27	00	10	-19	-13	-01	-07	07	06	07	00	-01	08	-04	09	-07	-02	-01	-00	-02	01	10	-03	02	03	-03	-23	-14	-04	-00	-06	-15	-10	-07	-15	-10	-08	-13
-02	02	-10	-04	-02	-02	04	-06	-10	06	-17	-12	-26	03	-02	03	-17	-10	-26	02	08	-13	-05	05	-07	07	04	05	-04	-02	-04	-07	07	-06	-04	03	02	02	00	00	-03	03	-06	-05	-11	-04	11	-04	08	-17	-10	-00	00	-04	-03	-13
22	06	02	09	08	09	30	14	10	09	-02	15	06	17	-05	23	25	12	12	15	12	15	23	12	-01	10	11	06	07	07	14	01	13	20	11	13	17	08	15	08	20	20	11	20	09	07	20	20	28	11	16	18	04	05	13	16

Appendix 4

Correlation Matrix of Ability, Personality, Interest and Achievement Variables, Directly Scored - Rural: Paxton. N = 124

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
1		00	-01	-05	-10	-16	-34	-25	-16	-11	05	-11	30	28	-18	-10	-03	04	-02	-06	26	16	21	-06	-28	12	-50	03	-03	22	-10	-12	-05	-07	01	21	31	18	-31	-07	-42	-21	-13	-05	-24	13	26	23	-25	-33	-17	-02	07	06	-10
2	00		00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3	-01	00		89	66	65	53	62	32	-02	-01	-23	04	05	-22	-15	-07	31	08	18	05	08	-01	14	-13	-01	-16	09	-13	10	07	-05	06	03	09	00	-01	-01	15	-01	-03	-15	10	18	01	-03	02	19	-05	21	-15	-39	-10	10	31
4	-05	00	89		74	68	51	58	40	-02	-07	-19	05	09	-21	-21	-09	28	10	16	10	-01	05	18	-14	06	-16	03	-15	08	13	-07	03	00	07	-03	-02	-02	16	02	-05	-15	16	15	-03	-05	-00	20	-06	17	-13	-31	-06	05	26
5	-10	00	66	74		76	61	61	53	09	-06	-28	00	00	-18	-10	03	34	10	16	08	-09	08	25	-12	05	-14	01	-21	08	20	-06	04	15	-02	-07	-05	00	20	13	01	-16	04	02	06	-18	-00	11	10	17	-20	-35	-10	19	35
6	-16	00	65	68	76		56	72	56	08	-06	-06	08	02	-26	-20	07	41	15	37	-06	04	-05	13	-01	04	-14	-02	-20	16	11	01	10	15	-00	-07	-10	-09	26	06	09	-09	08	17	24	-16	-12	09	10	24	-22	-27	-04	10	39
7	-34	00	53	51	61	56		65	42	18	-06	-11	-10	-11	-11	04	-05	36	18	29	-11	-07	-10	14	04	-01	05	-05	-15	-06	22	05	03	12	05	-21	-12	-07	20	-01	13	-11	09	06	21	-07	02	-04	27	29	-13	-32	-13	05	37
8	-25	00	62	58	61	72	65		59	25	-02	-17	09	-02	-25	-06	10	60	22	42	-03	-05	-10	10	08	06	-06	12	-24	06	14	-12	08	18	04	-15	-14	-14	34	05	10	-09	02	07	16	-06	-05	09	16	33	-20	-42	-09	14	56
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11	05	00	-01	-07	-06	-06	-06	-02	-06	36		23	43	33	11	-03	-13	11	10	09	06	-05	18	09	-00	-04	-14	05	-14	-03	07	-05	-05	-01	-09	05	22	04	01	02	-04	06	-19	-02	-12	12	07	09	06	05	-11	-21	-01	04	14
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23	21	00	-01	05	08	-05	-10	-10	-08	01	18	05	10	12	06	06	-05	-05	-16	06	03	11		18	-33	-09	-25	11	05	-04	-19	-01	-24	24	-07	29	31	18	-27	03	-23	-18	02	00	-06	14	-12	11	-09	02	-01	02	-05	07	09
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Appendix 4 (Continued)

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-20 02 01-11-07-14-17-20-19-13-12-23-14-24 11-01 18-19-10-09-20 04-11-06 06 04-05-15 10 14-09-09-12 09 03 23-16-13-04-11-21 07-26 19-13 06-11 04 14-32   -05-05 09-16
-12-13-13-11-12-07-05-05-10-07-05-05-05-03 12-02 06-13-09-09-11-10-13-02-22 03 11-09 07-18-13 07 20-09-06 11 01 01 04-20 09-03-09 10-10-21-04-13-03-02-05    06-06 02
-17-12-10-09-15-18-18-12-21-15-19-12-16-15 00-01 13-23-06 01 01-11-05-00-01-04 13 08 05-22-22 02-13-16-04-07-04 01-12 20 13-12-02-06-00-06 02-01-17-07-05 06   -16 10
-25 03-05-13-14-06-11-17-18-15-11-15-28-25 12 04-00-12-17 02-17-23-20 06-10-11 15-09 16-07 08 03 07 13-19-06-02-17-05-03-09-22-03-05-21 14 05 04-16-26 09-06-16   -03
 02 03 12-04-03-01-03-01 02 05-08-05 08 01 07-02 08-20 10 06 04-14 01 03 10-02 01 06 02-06-30-03-08 01-04 01-08-05-05 09-13 03 01-16 05-14-08-13 00-07-16 02 10-03
```

Appendix 5

Correlation Matrix of New Arrangement of Ability, Personality, Interest and Achievement Variables on Combined Urban and Rural Sample

N = 277

Appendix 5 (Continued)

```
56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09
```

APPENDIX [illegible]

[illegible] Factor Residual Matrix
Combined Urban and Rural Sample
N = 277

Appendix 7

The 36 Factor Reference Vector Intercorrelations at Simple Structure

```
+12+10+17+05-06-08-01-14-14+15+14-05+21-02+06-06-02
   +05+04-08-05-03-09+10+06-05-03-20-04-01-13-07-03
      -04+07+10+06-08+28-12+00+15-06+17-16+03+06+16
         +04+02+09+01-02-04-03-03-05-02+02+01-03-02
            +00+27+13+09+12+07-06+04-05-09+09+12+01
               -13+09+06+28+04+12-05-02+04+03+02-07
                  +09-10+06-04-23-13+14-05+02-06+01
                     +08-07-03+04+06-03+12+00+04-01
                        -05-05+01-01+03-03+03-06-01
                           -07+02+04-12+06-02+07-00
                              +04+13-25+00+06+02+05
                                 -03-09+01-04+08+01
                                    +06-12-04-00-01
                                       -02+07-05+00
                                          -11-16-15
                                             -02-02
                                                -25
```

Appendix 7 (Continued)

```
+02-05+02-00+09-00-07-01+01+15+04-02+26+05-01-26+15+25
-02-22+04-08-07-01+09-01-07-03-07-02-08-04+00+00+02-09
-03+05-10+01-08-06-21-04+10-11-03+01+10+05+01+02+03+22
-01-06-02-09-08+23-05+04+00+02+00-07-01+08+10-01+01+13
-08+18-10+05+23-01+04-10-02-10+30-10+08+08+27+08+05+14
-09+18+10-18+10-09-06+03+12+06-13+01-01-06+03+09-01+03
+00-03-16+09+08+04-01+02-09-07+01+01+02+06+14-02+06-00
-12+09+11+05-02-07+13+02+02-06+03+09-03+02-06+05-08-11
+01+21+14+13+03+05+03-15+24-25-04+10-09+00-03+06+03-01
+04+03-01+03-06-06+07+10+11-00+08+05+00+05-02+05+21-27
-02+09+00-03+06-10+01+07+09+09-00-02+05+07-01-05-07+12
-16+04+01-06+04-02+08-03-11+05+17-13-04-05+00-02-11+11
+07+16+18-09-01+01+00-00-04-27+01+02+06-01-05-13-13-03
+06-01+03+11-05-04-06+03+28-04+03+01+14-09-10-11+01+08
-08-31+07-07+05-04+05+06+07+06+03-02-13+08+01-02-04-03
-29-00-15+07+03+07-06-05-05-01-04-03+09+01+02-01+17+21
-23-01-00+00+02+03-02-08+12+01-06-00+02+02+08+12-01+02
+03-14-02-01+05+03+03+10-11+01+01-12+10-02-08+01+05-03
   -20+09-06+00+01+04+04+01-03+00+01-02+04-09-15+02-10
      +02+00+11-00-02-04+18-13-13+04-02+03+07+10-03+10
         -11-14-02-05+01+03+04-04+14-04-04-03+04-02-02
            +10-02+03+00-04+01-06+02+02-04-04-11+05-01
               -05+07+04-01+06+08-04+07+08+09-06+02+02
                  -05+00+06-07-01-01+04+05-02-11-07+07
                     +03+09+07-04+13-06-01-12-04+02-07
                        +04+05+06+06-16+11+03+01+09-01
                           +06+12-02-09-05-00-03-03-03
                              +16-04+13-04-07-17+07+15
                                 +14-24+06-02-08-09-15
                                    +00-03-03-11+07+07
                                       +07+07+15+01-14
                                          +09-20-01-01
                                             -03+01+11
                                                -05+19
                                                   -08
```

APPENDIX 8

Centroid of Checking Study on
Dynamic Structure of 72 Attitude Variables

```
+08-21+35+17-24+22+05+03-13-02-21-13-15-08+11+09-17+23-07+06-09+12
+09-36+35+13-31+07-06+22-10-18+12-11-11+07-06+11-19+02+09-12-13-03
+42-07-15-13-13+08-14+28-16-08+06-26-13+19-18-15+09-24-03-11+12+09
+15-24+08-02+18-22-34+09+10+03-08+22+08-24-25+11+05+09+16-19-14+03
+32-37-03+06-24-08-15-13+12+24+04+11+03+18+13+14+14+09+12-15+12+12
+36-33+30+09-26-18+17+14-09+06+14-15-07+12-11+22+05-07+09+06-08-19
+26-21-34-10+21+29-07+26+07+13-03-13-12+08+21+08+11+09+11+10+09-15
+46-27-18-22+22+13-07-02+10+15-04+08-13+10+10-18+03+11+22+06+03+09
+04-35+30+07+17-14+24+19-22-19-04-05-09+18+12+13+12+09-22+07+03-04
+23-37-08+03-17-30+03+07+22+22-24+13-16-12-05+20+03-11+03+18-06+03
+25-20+39+05+13+11-23+09-14-05+08+09-09-13-07+15-17-28+14-02+07-15
+18-17+23+14+06-06-14-21-09+30-29+20-13+10+08+07-05-11-13-17+02-09
+48-37-31-22+21+24+22+02-26-08+08-08+17+08-04-03+03+06+04-06+09+11
+44-51+27+08-16+20-07-14+08+14-13-09+15+06-09-28+09-09-07-03-06-07
+23-28-22-15+29-07+15+05+19+08+10-14+23+23+03+03-20-22+10+07+02+05
+33-47-25+19+27+17-14+17+10-11+07+02+06-11+04+06+13+04-16+12+06-06
+11-38+14+20+28-10-08-07+17-30+08-11-08+03-12-12-11+21+16+19-14+22
+08-50+10+27+09-23+03+10+12-04+08+20+16-11+22-10-14-03-07-14-07-11
+23-19-35+17+18-12+12-24-10+03+14+03-12-04+18+05+23+12+07-06-07+20
+13-19+30+15+06+06-19-08+09-19+27+12+14+09-09+09+08-17-13+31-14+09
+40-23+14+22+10+05+19+18+24+05+10+08+13+05-08-15-07-05+08+08+11-13
+25-36-05+22-12+18+10+03+16+10+14-10-14-28+16-09+23-10+07-04-07+08
+24-27+11-09+18+26+02-23+09-25-27-19+05+07+09+05+09+16-06+09-02-11
+29-46-28-09-04+10-11+10-02+20+08+07+23+10+05-06-19+16-04-05+03-09
+05+27-03-12-10-31+26+26+18-29+18+14-05-10+22+09-13+04+10+14-02-12
+16-17+41-34+06+08-13-20+19+07-23+16+08+08-15+17-14-07+04+14-20+07
+44-17-07-07-06-09+24-24-07-12-14-04-16-13+13-15+16-19-07-08-15-12
+06-25-22+13-22-22+09-12+13-15-04+15-08+29-26-08+12+10-12-11+10+05
+38-33-23-10-14-13+33-08-09-13-16+11+10+07+06+16-18-11+12+05+11+14
+34-30-34-16-16+32-10+06-08-08+11+12+08-08-02+09+04+26-11-07-13+11
+29-18-29-15+16-18-04-15-22-05+16-30-10-14-10-11+14-03+04+02+02-20
+33-06-31-30-03-18-26+08+06-27+11-09+02+09-11+14+17+03-15-06-11+09
+27-32+13+21+03-24+08-12-17+09+26+03+17+03-02-08+16+07-12+10+04+07
+28-09+21+13-13-15+08+09-24-11+11+06+07-11+14-14-09-05+26-04-04-02
+38-42-22-07-25+23-05-08+14-17+15+13-12-20-02+10-08-11-15-02+14+09
+30-27-20+08+11-15-26-13+10+13-03-10-11-07+11-22-17-13-13-12+19+08
+56+40+09+02+14+19+19-06-15-23-17+15+13-16-10+03+16+01+02-12-04+04
+71+17+09+35+16+10+07+07+06-10-08+12-04-06-05+10+08-07+05-14+16+13
+69+37-13+16+11-10-10+19+09+03-06+02+07-08-05+02+01+03-01-09-11-08
+57+36+09+23+17+14-11+07-07-07+09-07-14-10+20+03-07-04-03+06+18+04
+70+25-12+12-12+11-09+19+23+04-08-06+16-04-12+10+06-06+10-06+03-05
+72+35+04+03-05+05+03+15-07-05+02-04+06+08-09-15+07+07-12+10+08-04
+54+37-08-24+06-08-13+27-09-03-14-10+14+06-01-05+07-11+15-09+09+12
+60+29+02+05-15+24-17-14+08+15+10-18+22+01+19+02+08+02+09-15+01-06
+74+29-14+13+11-17-08-14-11+18+07-04-08+07-03+04-08+11-02-10-03-10
+52+20+18+26+24-08+07+11+12-12-14-36+07+02-07-11+07+03+11-05-02-05
+49+40+21-18-20+05-05-18-13-17+09+14-05+18+08-13-05-04-08-16-12-06
+54+36-06-06+14-18-07-24+14-18+04+11+03-08-13-05+05-04+02+03-09-05
+11+24+24-36-11-12+10-11+17+11+12-19-12-11-06+24-09-02-05+12+12-12
+11+03+38-17-13+04-16+05-16+19+15+24-26+19+14-07+16-10-04+11-16+03
+09+29+33-45-07-24-20-09+08+05-12+08+03+05+26-14-09-11-08-02+09+10
+32+12+39-22-04-16-08+03-05+13+07-14-04-09-20+01+10+04-11+04+12+12
+16-05+37-14+13+12+15+08-20+16+12+23-14+10-09+12+06-07+10-19+10-09
+11+17+36-21+07-10+25+21+23+25+19+20-18+20-03-09-10+08-11+08-08+05
+64+36-10+07-12+09+03-17+12-07+04-04+16+14+20+04+03-07-05-12-09-07
+65+35-14+15+10+11+18-09+05+03+06+20-08+12-15+05-02-03-12-07-13+11
+66+41-16+12-05+10+11-16-17-03-04+07+21+09-06+12+03+04+10+08+11-14
+65+37-13+07-13+14-03+15+06-12-13+18-15+01-04-03+03-14-05+08+07+04
-01+17+22+04+13+07+11-14+16+10+21-18-14-04+06+10+14-19+10+07-09+14
+16-10+06-04-12+13+20-22+16+31+09-19+12-26+11+05-19+07-07-21+13-02
+61+31-10+04+08+04+20+11+04+15-14-13-03-08-04-17-16+13-08+03-10+04
+73+35-18+11+08+09+02+10+01-02+10-14-11+06-08-01-04-06-05-09-02-06
+68+47-14-03-06+11+11-21-13-06-06-01-07-07-04-06-07-11+02-02-16+05
+63+49-16+04+13+05+09-23+02+02-08+12-20+06-16-03-06+14+02-02+11-08
+64+39-03+08-05+04+06-02-05+17+12-11-02-07-13-11-03+09+10+05+04+09
+36-18+11-29-16-09+19+20-05+18-18+03+12-10-18-17+12-13-16+18+05+08
+70+35-15+05+04-11-19-05-21+06-11-17+09+03+08+14-02-01-07+06+04+01
+59+43+05-04-11+02-13-11+17-07-06-04-05+11+08+10+13+15+07+03-03+02
+65+25-05-06+11+04-07-02-13+07-04-03+13-21+07+06+04+02-10+16+04-08
+62+29-21+15-12+09-17-03-18-02+14+15-08-18-11-12-05+21+10+14-07-15
+74+28-20+14+01+09+10+11-08+07-13+06+07+05+08+02-09-11-02+08-13+08
+59+44-21+06-19-06-08-04-02-04+03-08+07+08-08+07-13-12+07+05+04+10
```